Niagara District Fisheries Management Plan

1989 - 2000

Ministry of
Natural
Resources
Lyn McLeod
Minister

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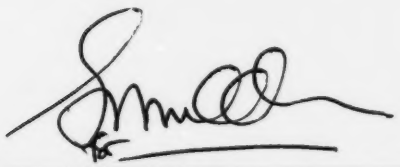
PREFACE

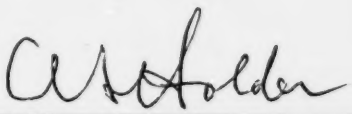
This fisheries management plan, prepared under the general context of the Niagara District Land Use Guidelines, outlines the long-term management direction (1989-2000) for both inland and Great Lakes fisheries within the Niagara District. An adjacent portion of Lake Erie within Simcoe District is also included in the Niagara plan.

The plan's purpose is to provide guidance to local fisheries managers and indicate future management direction to the public by specifying objectives based on current resource information and listing strategies to achieve those objectives.

Input obtained from public review of the Niagara District Fisheries Management Plan, 1988-2000, Draft, is incorporated into the Niagara District Fisheries Management Plan, (1989-2000).



District Manager
Niagara District



Regional Director
Central Region

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this fisheries management plan is to outline long-term fisheries management programs and to identify specific short term (5 year) management activities to be carried out on both Great Lake and inland waters of the Niagara District and its extended planning area.

1.2 THE PLANNING AREA

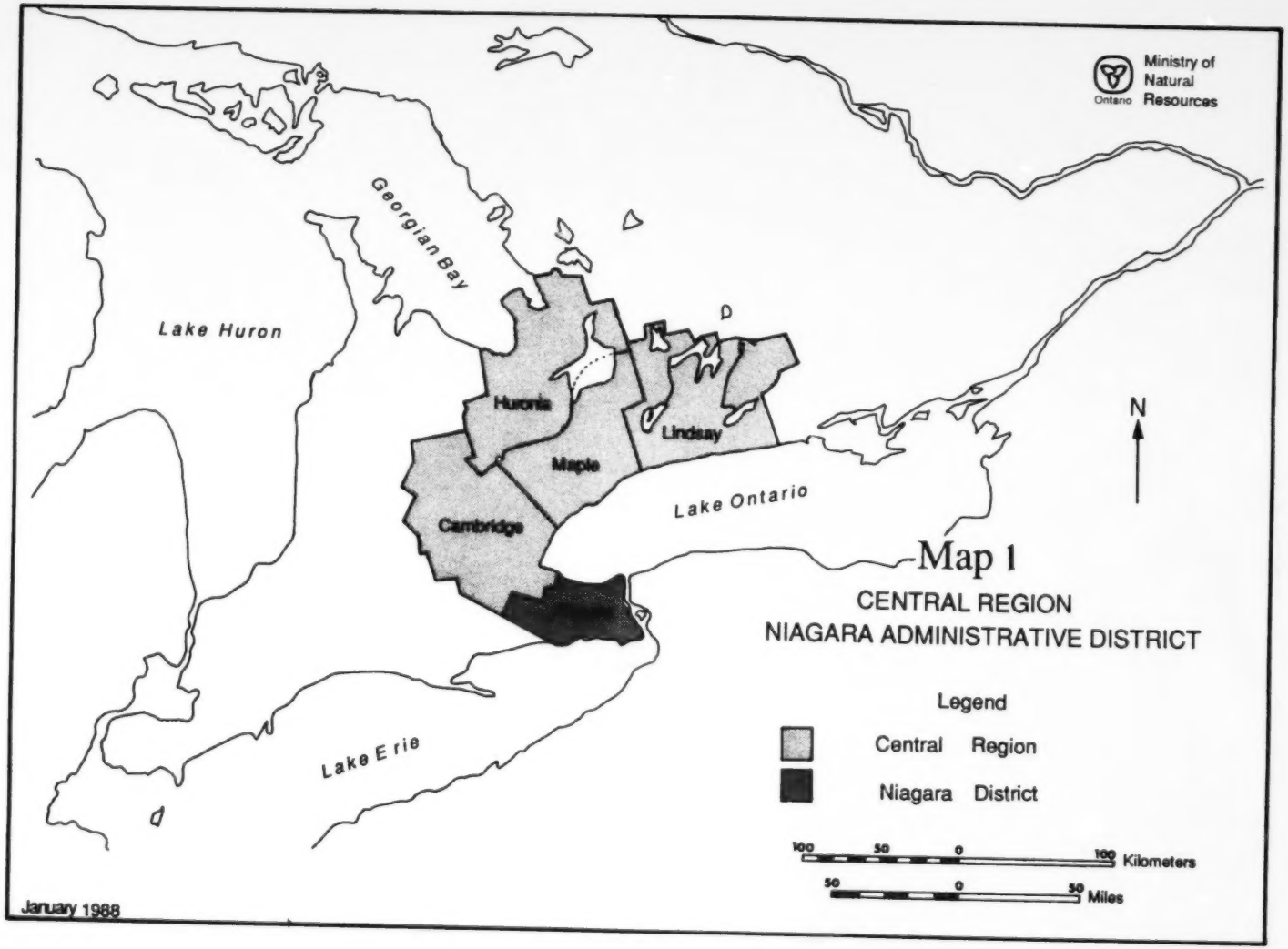
The Niagara District is the most southerly district of the Central Region of the Ontario Ministry of Natural Resources, lying between the western end of Lake Ontario and the eastern end of Lake Erie (Map 1). The Niagara District encompasses a land area of 273,400 hectares comprised of the Regional Municipality of Niagara and the townships of Seneca, Oneida, North Cayuga, South Cayuga, Canborough, Dunn, Moulton and Sherbrooke in the former County of Haldimand, now Regional Municipality of Haldimand-Norfolk. The western Niagara District boundary follows H/N Reg. Road 20 and its straight line extension to lake Erie and onward to the international boundary. Other Niagara District boundaries are formed by Lake Ontario to the north, Lake Erie to the south and the Niagara River to the east.

The District also includes 147,300 hectares of surface water area. Of that total, 143,000 hectares are Great Lakes/Niagara River waters. The remaining 4,300 hectares are inland waters comprised of estuaries, ponds, reservoirs, rivers, streams, canals and agricultural drains.

In addition, all of Lake Erie Commercial Fishing Statistical District 5 (O-E 5), shared 35% by Niagara District and 65% by Simcoe District, forms part of this planning base, adding a further 110,500 hectares for fisheries management planning purposes. The decision to include this portion of Lake Erie in the Niagara District was based on the fact that all traditional ports of landing for commercial fishing boats in this area lie within the Niagara District. The enlarged planning area is illustrated in Map 2.

1.3 THE PLANNING PROCESS

The Ontario Ministry of Natural Resources has undertaken a coordinated planning program to manage Ontario's natural resources. The general policy framework, management principles and objectives for fisheries management originated with the task force on Strategic Planning for Ontario Fisheries (S.P.O.F.) in 1976 (Environment Canada,


Ministry of Natural Resources
Ontario
Georgian Bay
Lake Huron
Huronia
Maple
Lindsay
Cambridge
Lake Ontario
Lake Erie
N
Map 1
CENTRAL REGION
NIAGARA ADMINISTRATIVE DISTRICT
Legend
Central Region
Niagara District
100 50 0 100 Kilometers
50 0 50 Miles
January 1988

O.M.N.R., 1976). Basic priorities listed by S.P.O.F. were to protect, rehabilitate, enhance and maintain Ontario's fish communities and their environment and to provide optimum angling opportunities and associated benefits to society. The more regionally oriented Southern Ontario Coordinated Program Strategy of 1982 provided overall direction in the form of general policies, guidelines and targets for resource management in Southern Ontario. The Niagara District Land Use Guidelines, (O.M.N.R., 1983), defined resource management objectives and strategies at the district level.

The original fisheries targets and management direction in the District Land Use Guidelines, (O.M.N.R., 1983) were formulated with the best available information. During the fisheries management planning exercise, new data were used to formulate more realistic and up-to-date targets. With approval of the District Fisheries Management Plans, the District Land Use Guidelines have been amended simultaneously to reflect changes in fisheries targets and management direction.

The Niagara District Fisheries Management Plan will now indicate how fishery resources will be managed to achieve the targets contained in the District Land Use Guidelines. Lake Erie and Lake Ontario Management Plans are being prepared concurrently with the Niagara District Fisheries Management Plan to provide an even wider, integrated guide for district planning.

The implementation schedule of the Niagara District Fisheries Management Plan also helps guarantee that the plan will continue to reflect district management goals, including possible future changes in objectives. The plan is to be reviewed at a minimum of five-year intervals or whenever major revisions are considered necessary.

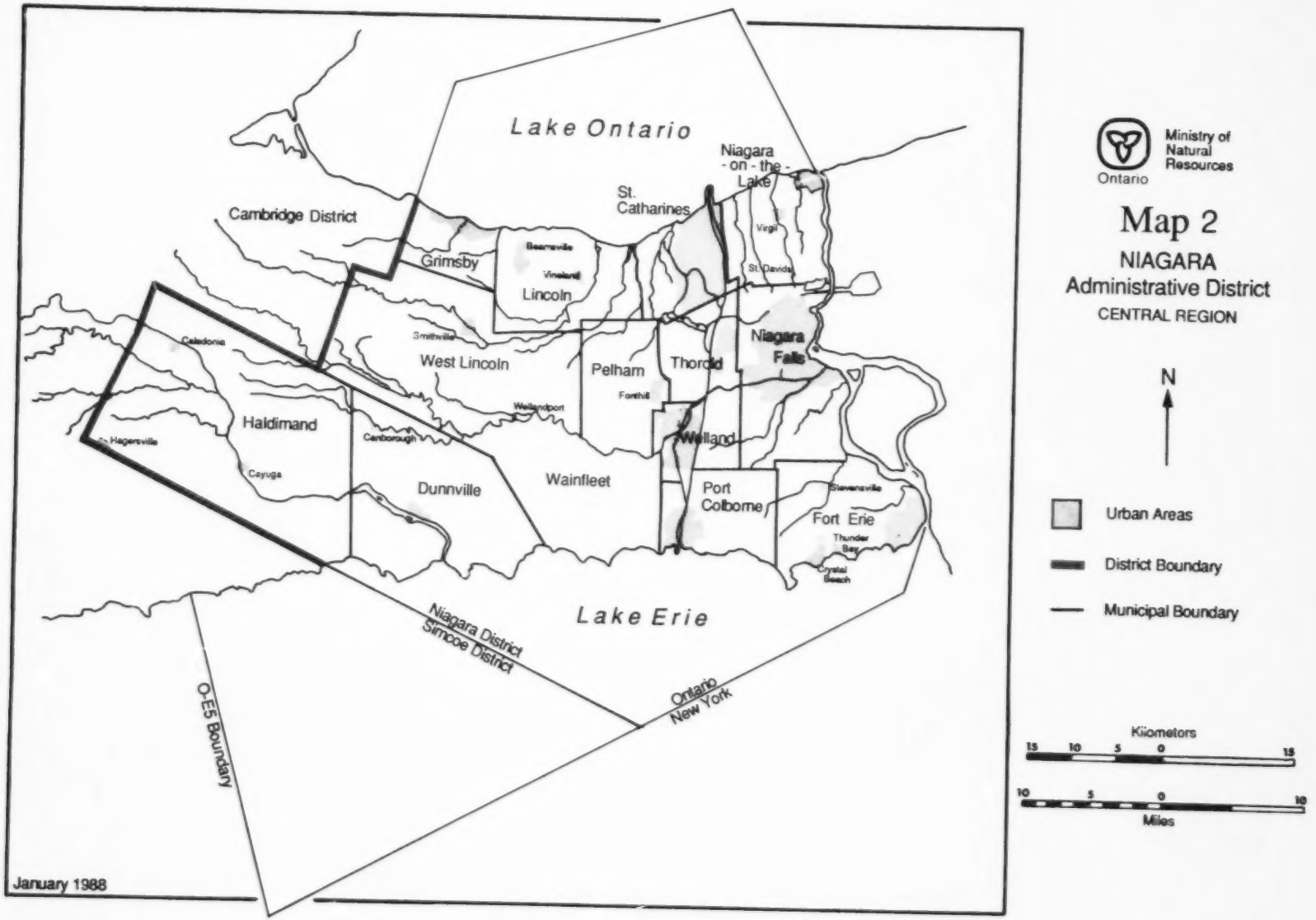
Equally important, the planning process includes direct public consultation and involvement during the formulation of the plan and will continue to do so in the future.

1.4 BACKGROUND PAPERS

As with any integrated resource management program, this plan is the product of a variety of related studies and planning exercises. Background documents available at the Niagara District office include:

- Niagara District Fisheries Management Plan Terms of Reference (Euler, 1985). Outlines the fisheries management planning process and provides a detailed timetable for the completion of each phase.

- Background Information and Optional Management Strategies, Niagara District Fisheries Management Plan, 1986-2000, (Lewies, 1986a).


Lake Ontario
Niagara - on - the - Lake
St. Catharines
Cambridge District
Grimsby
Beamsville
Vineland
Lincoln
Virgil
St. Davids
Niagara Falls
Caledonia
Smithville
West Lincoln
Pelham
Fonthill
Thorold
Wellandport
Haldimand
Hagersville
Canborough
Cayuga
Dunnville
Wainfleet
Welland
Port Colborne
Stevensville
Fort Erie
Thunder Bay
Crystal Beach
Lake Erie
Niagara District
Simcoe District
Ontario
New York
O-E-S Boundary
January 1988
Ministry of Natural Resources
Ontario
Map 2
NIAGARA
Administrative District
CENTRAL REGION
N
Urban Areas
District Boundary
Municipal Boundary
Kilometers
15 10 5 0 15
10 5 0 10
Miles

Consolidates district fisheries information into a comprehensive document providing basic direction for the fisheries management plan

- Background Information and Optional Management Strategies, Niagara District Fisheries Management Plan, 1986-2000, Summary (Toll and Euler, 1986). An abbreviated version of the previous document prepared for use at public consultation meetings.

- Summary of Public Responses to the Background Information and Optional Strategies (Lewies, 1986b).
Summarizes the questionnaire responses and public comment generated at the open houses.

- Addendum to the Niagara District Fisheries Management Plan, Background Information, (O.M.N.R., 1987b). Outlines changes in fishery data resulting from enlargement of the boundary water planning base.

- Niagara District Fisheries Management Plan, 1988 - 2000 Draft, (O.M.N.R., 1988)

- Niagara District Fisheries Management Plan, Draft, Analysis of Public Comment (Lewies, 1988)

2.0 DISTRICT FISHERIES PERSPECTIVE

2.1 THE FISHERIES RESOURCE

The land form of the Niagara District is in three physiographic units. The Iroquois Plain edges the north. The Haldimand Clay Plain dominates the south and central area. Separating the two plains is the geologically prominent Niagara Escarpment, (Feenstra, 1981)

Except where drainages cross the escarpment, most of the rivers are meandering and slow-moving. Ninety-five percent of the district's surface water is contained in Lakes Erie and Ontario. The turbulent Niagara River accounts for another 2%. The Grand River represents 1%. The remaining 2% is made up of the Welland River, the Welland Canal, the Chippawa-Queenston Power Canal, Queenston Reservoir, Lake Gibson, Moodie Lake, Martindale Pond, the estuaries of Jordan Harbour, Fifteen and Sixteen Mile Creeks and numerous warmwater streams, drains and ponds. Apart from coldwater fisheries habitats found in the two Great Lakes, the district's cold water fishery resources are limited to Twelve Mile Creek, near Fonthill, a few spring-fed ponds and seasonal spawning runs in a number of Great Lakes tributaries. The single coldwater stream and the few ponds account for an insignificant percentage of district waters.

Lakes Erie and Ontario and the Grand River support both commercial and sport fisheries. Lake Erie and the upper Niagara River fish populations provide high quality angling for yellow perch, smallmouth bass, muskellunge, northern pike and other warmwater species such as white bass, white perch and freshwater drum (sheephead).

The Lake Ontario-lower Niagara River sport fishery is dominated by the salmonid fishes including chinook and coho salmon, rainbow, brown and lake trout.

The Grand River and other inland fisheries are dominated by warmwater species such as carp, bullhead, channel catfish and members of the sucker family.

The upper Niagara River's emerald shiner population is the mainstay of the district's baitfish industry accounting for 73% of the annual harvest.

The total potential yield for the Niagara District is 1,078,200 kg per year (Table 1). By location, Lake Erie and the upper Niagara River is capable of supplying 716,500 kg per year, Lake Ontario and the lower Niagara can supply 259,000 kg each year, the Grand River can supply 54,100 kg per year and the other inland waters, 48,600 kg per year.

By species or species group most of the potential yield is available as rainbow smelt (283,500 kg/yr.), followed by percids (yellow pickerel and yellow perch, 240,100 kg/yr.), salmonids (salmon and trout, 194,500 kg/yr.), baitfish (144,100 kg/yr.) and centrarchids (bass, sunfish and crappie, 76,900 kg/yr.). The balance of the potential yield (139,100 kg/yr.) is made up of various species including northern pike, muskellunge, white bass, white perch, carp, goldfish, bullheads, catfish and other coarse fish species.

Niagara District's fisheries resources are graphically illustrated in Map 3.

2.2 CURRENT USE AND PROJECTED USE

Information in this section will identify how the fish resources are currently being used by sport, commercial and bait fishermen, and indicate what the projected use will be by the year 2000 (Tables 1 and 2).

The current use and potential yield for Niagara District waters and O-E 5 are presented in Table 1. Current harvest levels are self explanatory but it should be emphasized that annual potential yields are theoretical values based on the capacity of the resources to replenish themselves.

The current fisheries harvest is estimated as 1,619,600 kg a year which is considerably more than the estimated potential yield (1,078,200 kg) and requires some explanation. Approximately 79% of the current harvest is taken by the commercial fishing industry on Lake Erie and the main discrepancy between current and potential yield can be seen by looking at their harvest of rainbow smelt (Osmerid).

Because of the life history of the smelt (short life span, low position in the food chain, high reproductive potential), population levels often fluctuate widely above and below the average level. Catch quotas, set annually in response to population levels, also fluctuate greatly and are currently very high. Over the long term, however, Lake Erie smelt harvests can be expected to decline, producing an average smelt harvest approximating the potential yield estimate of 272,000 kg. per year.

2.2.1 Sport Fishery

Estimates of current use have been calculated from creel survey data which indicate that anglers enjoy 247,400 angler-days (occasions or opportunities) fishing in the Niagara District and harvest 270,800 kg of fish each year.

TABLE 1 CURRENT USE AND POTENTIAL YIELD BY SPECIES GROUP FROM NIAGARA DISTRICT WATERS FISH COMMUNITIES1

	Salmonid	Osmerid	Percid	Percichthyid	Esocid	Centrarchid	Bait	Other	Total
Current Use2									
Lake Ont./L. Niagara									
Sport	154,800	-5	1,500	700		700	-	6,300	164,000
Commercial	04	11,500	2,600	1,400		300	200	800	16,800
Total	154,800	11,500	4,100	2,100		1,000	200	7,100	180,800
Lake Erie/U. Niagara									
Sport	200	9,100	12,000	2,000	3,000	39,300	-	10,400	76,000
Commercial	100	1,047,700	58,000	35,300	0	200	113,500	31,400	1,286,200
Total	300	1,056,800	70,000	37,300	3,000	39,500	113,500	41,800	1,362,200
Grand River									
Sport	-	0	500	1,300		1,000	-	11,500	14,300
Commercial	400	0	200	1,700		0	15,000	13,100	30,400
Total	400	0	700	3,000		1,000	15,000	24,600	44,700
Other Inland Waters									
Sport	-	0	400	400		4,400	-	11,300	16,500
Commercial	0	0	0	0		0	15,400	0	15,400
Total	0	0	400	400		4,400	15,400	11,300	31,900
Niagara District									
Sport	155,000	9,100	14,400	4,400	3,000	45,400	-	39,500	170,800
Commercial	500	1,059,200	60,800	38,400	0	500	144,100	45,300	1,348,800
Total	155,500	1,068,300	75,200	42,800	3,000	45,900	144,100	65,800	1,619,600
Potential Yield3									
Lake Ont./L. Niagara	194,000	11,500	10,500	7,200	-	4,000	200	31,600	259,000
Lake Erie/U. River	500	272,000	228,000	16,200	4,800	63,400	113,500	18,100	716,500
Grand River	-	0	800	3,500	-	800	15,000	34,000	54,100
Other Inland Waters	-	0	800	400	-	8,700	15,400	23,300	48,600
Niagara District TOTAL	194,500	283,500	240,100	27,300	4,800	76,900	144,100	107,000	1,078,200

Footnotes 1 - (i) Coldwater Species Salmonid - chinook salmon, coho salmon, pink salmon, Atlantic salmon, lake trout, rainbow trout, brown trout, lake whitefish, lake herring.

(ii) Warmwater/Coolwater Species
Osmerid - rainbow smelt
Percid - yellow pickerel (walleye), yellow perch
Percichthyid - white bass, white perch
Esocid - northern pike, muskellunge
Centrarchid - smallmouth bass, largemouth bass, rock bass, bluegill sunfish, pumpkinseed, white crappie, black crappie
Bait - various minnow species (73% emerald shiner)
Other - includes carp, goldfish, brown bullhead, channel catfish, shad, alewife, freshwater drum, mooneye, bowfin, quillback, American eel, and etc.

2 - Values are taken from the background information document addendum, modified for recent changes in the Lake Ontario Salmonid Community and the expansion of the Lake Erie planning area (1985 Lake Erie commercial fish figures courtesy of E. T. Cox, L.E.F.A.U.

3 - Based on 1986 estimates for allowable annual harvest for O-E5 Lake Erie (L.E.F.A.U.) current commercial fish allocation for Lake Ontario and the Grand River plus historic information for sport fish and commercial non quota species.

4 - A zero indicates no harvest suspected or known.

5 - A dash indicates a known or suspected harvest and some potential yield of unknown quantity.

TABLE 2

FORMULATION AND TESTING OF FISHERIES TARGETS FOR NIAGARA DISTRICT

STRATA		Current Use		Projected Use		D.L.U.G Targets[1]		Potential Yield		Targets Year 2000	
		kg.	Angler-Days	kg.	Angler-Days	kg.	Angler-Days	kg.	Angler-Days	kg.	Angler-Days[1]
A) Sport Fishery											
i) Lake Ontario & Lower Niagara R.	W/C2	9,200	20,400	9,400	21,000			48,200	107,100	9,400	21,000
	S3	154,800	77,400	178,000	89,000			194,000	97,000	178,000	89,000
ii) Lake Erie & Upper Niagara R.5	W/C	75,800	105,300	87,200	121,100			100,800	140,000	87,200	121,100
	S	200	300	200	300			2004	300	200	300
iii) Grand River	W/C	14,300	29,800	15,700	32,700			23,700	49,400	15,700	32,700
iv) Other Inland Waters	W/C	16,500	14,200	20,300	17,500			33,200	28,600	20,300	17,500
Total (All Species)		270,800	247,400	310,800	281,600	355,300	326,000	400,100	422,400	310,800	281,600
(B) Commercian Food Fishery											
i) Lake Ontario		16,600		16,600				16,600		16,600	
ii) Lake Erie5		1,172,700		430,400				502,000		430,400	
iii) Grand River		15,400		15,400				15,400		15,400	
Total		1,204,700		462,400		269,000		534,000		462,400	
(C) Commercial Bait Fishery			Dozens		Dozens		Dozens		Dozens		Dozens
i) Lake Ontario & Lower Niagara		200	10,000	200	10,000			200	10,000	200	10,000
ii) Lake Erie & Upper Niagara		113,500	3,460,000	113,500	3,460,000			113,500	3,460,000	113,500	3,460,000
iii) Grand River		15,000	460,000	15,000	460,000			15,000	460,000	15,000	460,000
iv) Other Inland Waters		15,400	470,000	15,400	470,000			15,400	470,000	15,400	470,000
Total		144,100	4,400,000	144,100	4,400,000	144,000	4,400,000	144,100	4,400,000	144,100	4,400,000
(D) GRAND TOTAL		1,619,600	247,400	917,300	281,600	768,400	326,000	1,078,200	422,400	917,300	281,600

Footnotes 1 - The original 1983 District Land Use Guideline Targets were based on the best information available at that time and have since been improved; for example, the sport fishing targets were based on the 1980 Federal-Provincial mail survey of Ontario sport fishing which tended to overestimate angling use.

2 - W/C are the warmwater/coolwater species.

3 - S are the salmonid species.

4 - The potential yield of Lake Erie/upper Niagara River salmonids is not clearly known. Since this fishery has supported this much harvest in its recent history, the potential yield has been recorded as at least that much and is a minimal estimate.

5 - The Lake Erie/upper Niagara River balance of potential yield is 85,200 kg. is unallocated percid species to be maintained as a rehabilitation allowance.

Approximately 43% (105,300 angler-days) of the current sportfishing effort in Niagara District is spent seeking warmwater fishes in Lake Erie and the upper Niagara River. A further 31% (77,400 angler-days) is spent fishing Lake Ontario and the lower Niagara River for salmonids. Eighteen percent (44,000 angler-days) is spent on the Grand River and other inland waters harvesting various warm waterfish species. The remaining eight percent of the angling effort is made up of salmonid fishing on the upper Niagara River-Lake Erie (300 angler-days) and the warmwater fishery of the lower Niagara River-Lake Ontario (20,400 angler-days).

Lake Ontario-lower Niagara salmonids make up 57% (154,800 kg) of the current sportfish harvest. Lake Erie-upper Niagara landings of bass, yellow perch, walleye and other warmwater species form 28% (75,800 kg) of the catch. The Grand River (5%) and other inland waters (6%) contribute about 30,800 kg of the annual harvest. The balance of the harvest (9,400 kg, 9%) is attributable to Lake Ontario warmwater fish and Lake Erie Salmonid harvests.

Projections of sportfishing recreation and harvest are based on forecasted human population increases. Demand for sportfish recreation is expected to increase by approximately 14% to 281,600 angler-days per year by the year 2000. The sportfish harvest will be 310,800 kg with a harvest quality standard of 1.10 kg per angler-day.

Lake Ontario/L. Niagara salmonid harvest is expected to increase from 154,800 kg to 178,000 kg per year or up 15%. The Lake Ontario warmwater fishery increase will be minimal from 9,200 kg to 9,400 kg per year (+2%). On Lake Erie/U.- Niagara, the salmonid harvest is not well understood but is expected to remain relatively constant. Lake Erie/U.- Niagara's warmwater fisheries harvest is expected to increase from 75,800 kg. to 87,200 kg per year (15%) but because of improving percid populations most of this increase will be made up of those two species i.e. 12,000 kg to 23,400 kg per year (+95%). The Grand River warmwater sport fish harvest should increase by about 10% from 14,300 kg to 15,700 kg per year, while on other inland waters the increase will be in the range of 23% from 16,500 kg to 20,300 kg per year.

2.2.2 Commercial Food Fish Fishery

In 1987 there were 20 licenced commercial fishermen in the Niagara District. Ten operate on Lake Erie; six net the Grand River; and four are licenced for Lake Ontario.

The total landed catch of 1,204,700 kg in 1985 is used as an approximation of the current average harvest for these fisheries.

Lake Erie, O-E 5 commercial fish landings account for 97% (1,172,700 kg) of the harvest. Of the Lake Erie total 89% (1,047,700 kg) is rainbow smelt. Yellow perch and walleye make up 5% (58,000 kg) of the catch. The remaining 6% (67,000 kg) is composed of such species as white bass, white perch and sheephead.

Commercial fish harvests in Niagara District waters of Lake Ontario (16,600 kg) and the Grand River (15,400 kg) form 3% of total landings. The Lake Ontario harvest is composed of 69% (11,500 kg) rainbow smelt and 16% (2,600 kg) yellow perch. The remaining 15% (2,500 kg) include species such as rock bass, white bass and white perch. Ninety-nine percent of the Grand River harvest (15,200 kg) is such species as common carp, bullhead and channel catfish.

All Niagara District commercial fishermen have been regulated by catch quotas since 1984. Lake Erie quotas have been established for rainbow smelt, yellow perch, white bass, walleye and lake whitefish. Zero quotas have been set for Lake Erie lake trout, salmon and species that are not commercial fish. Lake Ontario quota species are yellow perch and bullhead. No salmon or trout may be taken. The Grand River has quotas on channel catfish, bullhead and common carp. Zero quotas have been placed on salmon, trout, yellow perch and walleye. Except for the Grand River, quotas are set to limit the catch within the bounds of the potential yield modified by variations in year class strength. Channel catfish, common carp and bullhead quotas on the Grand River have been set to encourage harvest in hopes of attaining a more desirable species composition in the population.

Projected use estimates of the commercial food fishery have been based on 1986 quotas for quota species and 1985 landings for non-quota species modified by the rate of decline of American smelt harvest and increase of percid harvests postulated for Lake Erie. This analysis suggests a requirement of 462,400 kg of commercial food fish per year by the year 2000. On Lake Erie, increases in walleye and yellow perch will be insufficient to balance the major decline predicted for rainbow smelt. In addition, 85,200 kg of the percid potential yield each year will be reserved for rehabilitation purposes. Lake Erie commercial fish harvests by the 2000 will average approximately 430,400 kg. Lake Ontario and Grand River landings will remain constant averaging 16,600 kg and 15,400 kg respectively.

2.2.3 Commercial Baitfish Fishery

In the Niagara District there are currently 17 people holding 68 licenses to harvest baitfish. In addition to catch licenses there are 16 people licenced as dealers (which includes preserving baitfish). There are also 17 non-residents licenced as dealers for the purpose of exporting only. The present Niagara District baitfish policy is to issue no new catch licenses. With seven baitfish management zones in the district, the Niagara River is limited to six catch licenses with the remainder spread throughout the remaining six zones.

The current annual baitfish harvest is approximately 4.4 million dozen fish (144,100 kg). The current harvest is assumed to be both the potential yield and the projected use to the year 2000. Of the current harvest 79% of the catch comes from Lake Erie-upper Niagara River waters.

2.2.4 Target Modification

The Niagara District Land Use Guidelines (O.M.N.R.,1983) established targets for fisheries managers to achieve by the year 2000 based on the then current understanding of the district fishery. These targets were to supply 326,000 sport fishing opportunities, 269,000 kg of commercial food fish, and 4.4 million dozen baitfish annually by the year 2000.

The sport fishing target was based on the 1980 surveys of Ontario's resident and non-resident sport fishermen (Bedi and Clifford, 1983) which subsequently proved to provide inflated estimates of angler activity. The revised sport fishing target of 281,600 opportunities was based on the 1983 -1984 Niagara District Creel (Lewies et al, 1985) expanded for the expected growth in angler participation by the year 2000. Further modifications to angler-use estimates were based on the rapid expansion of the salmonid fishery on Lake Ontario (Daniels and Savoie, 1986) and the expected improvement of percids on Lake Erie.

Changes in the commercial fisheries target were also required, primarily because of the expansion of the Niagara District planning area on Lake Erie. The revised target is a harvest of 462,400 kg per year by the year 2000.

The Niagara District baitfish harvest target of 4.4 million dozen per year was based on the 1960 - 1976 studies of baitfish (Buckingham et al, 1977) and remains unchanged.

2.3 PROBLEMS AND ISSUES

There are a number of problems and issues associated with the management of the fisheries resources of the Niagara District. To facilitate discussion, these problems and issues will be described under the following four headings:

- Loss of Fish Stocks, Fish Habitat and Environmental Quality
- Supply and Demand of Angling Opportunities
- Insufficient Scientific Knowledge
- Public Education

2.3.1 Loss of Fish Stocks, Fish Habitat and Environmental Quality

The loss of fish stocks with resultant reduction of angling opportunities or commercial income, can result from a number of causes including overexploitation, habitat disturbance or loss, contamination and interspecific competition.

Overexploitation occurs when resource utilization exceeds the productive capacity of the fishery. In the Niagara District, overexploitation may have contributed to the reduction of Atlantic salmon, lake sturgeon and lake trout in Lake Ontario, lake sturgeon, blue pickerel and sauger in Lake Erie and muskellunge in the Grand River.

Primary habitat disturbance or loss, particularly on the Grand River and other inland waters, has been caused by deforestation and related agricultural development practices such as channelization of natural water courses to facilitate drainage. The result has been increased erosion rates and increases in nutrient and pesticide loads. Other effects include altered flow patterns by increasing runoff rates and flood peaks and reducing mean summer flows. Such changes tend to favour species such as carp and catfish while reducing carrying capacity for the more desirable northern pike, muskellunge and walleye.

Urban development of watersheds with more intensive drainage works, channelization, entombment of streams, shoreline modifications and dumping of contaminants, municipal storm water and heated water from industry have further intensified habitat losses. The smaller warmwater streams of Grimsby, Beamsville, Niagara-on-the-Lake, Niagara Falls and Fort Erie show obvious effects of such treatment. Another example is the elimination or partial elimination of Lake Erie smallmouth bass spawning areas in Fort Erie and Port Colborne because of shoreline dredging or filling.

Still another source of interference with fish reproduction in the Niagara District has been engineering works which block off streams or prevent migration of fish to spawning areas. The Welland Canal and old Welland Canal in the City of Welland separates the Welland River into three distinct sections with siphons passing 90 feet under the canal, probably precluding fish passage. Dams on the Grand River at Dunnville and Caledonia interrupt upstream movement of walleye, northern pike and possibly muskellunge and lake sturgeon, contributing to the decline of these species. Similarly, guard gates on drains entering Lake Erie to stop upstream flow and prevent flooding are believed to interfere with northern pike and muskellunge spawning runs.

Environmental contaminants can result in the loss of fishing opportunities in two ways: degradation of fish habitat and reluctance of anglers to fish for inedible fish. Urban areas are a major source of contaminants whether caused by accidental chemical spills, dumping of hazardous wastes or sewage plant effluent. Application of agricultural pesticides also adds contaminants to watersheds. Farm pesticides have been associated with brook trout deaths in the headwaters of Twelve Mile Creek.

Introductions or invasions of exotic species such as Pacific salmon, rainbow trout, brown trout, rainbow smelt, carp, alewife and white perch have also greatly influenced Niagara District fish communities in the last century. In Lake Ontario, native Atlantic salmon, lake trout and deepwater ciscoe have been replaced by Pacific salmon, rainbow trout, brown trout, alewife, rainbow smelt and others. In Lake Erie available evidence suggests sea lamprey numbers are increasing. Because lamprey are major sportfish predators their increase could hamper achievement of sport fishing targets.

The Ministry's involvement in the input and review of municipal planning documents under the jurisdiction of the Planning Act is considered to be a frontline for the defense of fishery habitat. By means of the municipal plan input process, Ministry programs can identify concerns and constraints to municipalities when development is first being considered for an area. If concerns are not addressed at the input stage, the ability to achieve fisheries objectives is reduced. The interrelationship of Official Plan policies, stormwater master drainage plans and specific subdivisions plans, require that each, in turn, must address Ministry concerns. Failure to expend time at the front end of the planning process and to maintain consistency leads to omission of concerns or confrontation at various points (planning committee meetings, Council or the Ontario Municipal Board).

The protection of the fisheries resource can utilize a variety of tools or schemes to achieve the Ministry's mandate. These "tools" include:

a) use of vegetative buffers adjacent to watercourses as outlined in the "Guidelines on the Use of Vegetative Buffer Zones to Protect Fish Habitat in an Urban Environment" (O.M.N.R., 1987a)

b) minimization of sediment movement off the development site

c) no flushing of stormwater systems in a development until accumulated sediments from construction activities have been removed and the area has been vegetated

d) zoning of protective strips along side of streams thus preventing development activities

e) refusal to allow channelization of streams

f) design of flood related structures to ensure fish movement, and to maintain base flow and water quality characteristics that support fisheries

g) treatment of stormwater to provide reductions in peak flows, sediment and pollutant concentrations

While not an exclusive list, the applicability of any protective measure must relate to the specific site characteristics and the impacts on the fishery resource.

2.3.2 Supply and Demand of Fishing Opportunities

Current fish supply in the Niagara District appears adequate to meet the total demand for fish by the year 2000. In some areas, the fish species available for harvest are not those preferred by the angler. A second problem is one of insufficient access to the resource limiting utilization or restricting utilization to a few individuals.

Anglers on the Grand River and other inland waters are primarily interested in fishing for walleye, bass and northern pike. These species exist only in limited numbers in these waters and catches consist primarily of carp, bullhead and channel catfish. The problem for managers is to improve the species mix. Solutions include improving water quality, habitat and access for the desired species. Another action contributing to the solution on the Grand River is to encourage the commercial harvest of the less desirable species thereby, perhaps, reducing the competition for more desirable species.

Limited access to the Niagara District's most highly productive baitfishing areas continues to pose a problem for fisheries managers by causing conflicts among the users of the resource. Resolution of the conflict entails consultation with the users to ensure equity among them.

Anglers in the Niagara District continue to complain about inadequate boat launching facilities and parking for their trailers. Most major centers along the Great Lakes in Niagara District do have facilities, however, long stretches of shoreline between centers do lack adequate access for boats.

Fisheries use by Niagara District's native peoples is not well understood. They have not been specifically identified in our user surveys but are included in them. Niagara District staff will continue to participate in Federal-Provincial-Native People negotiations of fishing rights and agreements.

2.3.3 Insufficient Scientific Knowledge

Fisheries managers often lack sufficient knowledge or scientific data needed to make informed management decisions. In Niagara, there is a general need to update and expand fish and critical habitat inventories to assist in setting management priorities. Existing fish production and potential yield predictions need refinement. There is at present no adequate method to assess baitfish production or verify har- vest statistics. Fish populations are continually changing and the causes are often unknown and therefore difficult to manage. The impacts and mitigation of habitat-altering activities are poorly understood and must be investigated if fish habitats are to be protected and present production maintained.

2.3.4 Public Education

Fisheries managers need to stimulate public interest in the complexities of fisheries management. With a more informed public, reduced conflict among users, reduced habitat loss, and an increased interest, work toward healthier fish communities will result. Ministry publications, local meetings, C.F.I.P projects and educational programs in area school systems will be utilized to accomplish this.

3.0 MANAGEMENT DIRECTION

3.1 GENERAL FISHERIES MANAGEMENT OBJECTIVES

The goal of the Ministry of Natural Resources is to provide opportunities for outdoor recreation and resource development for the continuous social and economic benefit of the people of Ontario and to administer, protect and conserve public lands and waters.

The objective for fisheries management in southern Ontario is to provide opportunities for recreation and economic benefits consistent with the maintenance of healthy fish communities.

Objectives at the district level as presented in the Niagara District Land Use Guidelines are:

- To meet sport fishing demand within the limits of a wisely managed, rehabilitated resource.
- To maintain a viable commercial fishing industry.
- To manage local baitfish stocks to maintain a viable commercial industry consistent with stable baitfish populations.
- To prevent extinction of any native species.

3.2 SPORT FISHERIES MANAGEMENT

- **Objective:**
  To meet sport fishing demand within the limits of a wisely managed, rehabilitated resource.
- Targets
  The recreational fishing target is to provide 281,600 angler day opportunities annually by the year 2000, an 18% decrease of the Niagara District Land Use Guidelines target of 326,000 angler days. In terms of harvest, the target is to provide a total sportfish harvest of 310,800 kilograms annually by the year 2000. Target harvests may be partitioned to management area and fish community types as follows:

3.2.1 Lake Ontario-Lower Niagara River

Salmonids - to provide a harvest of 178,000 kg and supply 89,000 angler-days per year, by the year 2000.
Warmwater/coolwater species - to provide a harvest of 9,400 kg and supply 21,000 angler-days per year by the year 2000.

3.2.2 Lake Erie-Upper Niagara River

Salmonids - to maintain a harvest of 200 kg and supply 300 angler-days per year.

Warmwater/Coolwater Species - to provide a harvest of 87,200 kg and supply 121,100 angler-days per year by the year 2000.

3.2.3 Grand River

Salmonids - spawning runs from Lake Erie - insufficient data to set a target level - there are no resident salmonids.

Warmwater/Coolwater Species - to provide a harvest of 15,700 kg and supply 32,700 angler-days per year by the year 2000.

3.2.4 Other Inland Waters

Salmonids - spawning runs from Great Lakes and Niagara River - insufficient data to set a target level - resident salmonids - insignificant numbers, allowable harvest estimate of approximately 39 kg per year (excluding stocked fish at public fishing areas).

Warmwater/Coolwater Species - To provide a harvest of 20,300 kg and supply 17,500 angler-days per year by the year 2000.

3.2.5 Discussion

Lake Ontario-lower Niagara River salmonid species currently provide one of the most noteworthy recreational fisheries in the Niagara District. Salmonid species from these waters will supply approximately 32% of the recreational fishing and 57% of the district angling harvest by the year 2000. Pacific salmon are the most highly sought species. For that reason their numbers will be maintained by a significant stocking program since there is little natural reproduction by these fish in Lake Ontario or its tributaries.

Salmonid angling harvests from waters other than Lake Ontario and the lower Niagara River are comparatively low. Production data and harvest projections are lacking. Stocking by other jurisdictions (mainly U.S.) maintains populations of salmon and trout in Lake Erie with attendant spawning runs occurring in the upper Niagara and Grand Rivers. New York State stocks lake trout in Lake Erie's eastern basin for rehabilitation of that species. Future assessment is required to predict the contribution of the salmonids to the Lake Erie-upper Niagara River fishery.

Natural salmonid populations in inland waters are rare. Niagara District has one coldwater stream (length 25 km) supporting native brook trout with a current estimated annual potential yield of about 39 kg (Sarvis, 1985). It is doubtful, even with habitat improvement, that the allowable harvest could be much more than doubled. In addition, two put and take rainbow trout areas are maintained for public use (one private, one public ownership). Both of these fisheries are small with limited production. Management direction will be directed toward protection, maintenance and whatever limited expansion is possible for these fisheries.

Significant angling harvests of warmwater/coolwater species occur in all areas of the Niagara District. By the year 2000 these fisheries in Lake Erie-upper Niagara River, the Grand River, Lake Ontario-lower Niagara River, and other inland waters will be supplying 43, 12, 7 and 6 percent of the district's recreational fishing and 28, 5, 3 and 6 percent of the angling harvest respectively. Management direction will emphasize habitat protection and providing anglers with a desirable fish species community.

3.3 COMMERCIAL FOOD FISHERIES MANAGEMENT

- **Objective:**
  To maintain a viable industry by encouraging the harvest of commercial food fish stocks under the quota management system where it is biologically and economically feasible.

- Target
  To sustain an annual average harvest of 462,400 kg of commercial food fish species from Niagara District waters and the balance of Lake Erie commercial fishing zone, O-E 5.

3.3.1 Discussion

The approach to commercial fisheries management is to establish long-term targets based on potential yield realizing there might be short-term fluctuations in harvest arising from varying year class strengths. Where a fish species is sought by both commercial and recreational fisheries, a portion of the potential yield is allocated to each fishery. In addition, on Lake Erie a significant amount of percid potential yield is reserved for the continued rehabilitation of walleye and yellow perch stocks.

While commercial fishing quotas should serve to maximize harvests, ensure stable fish populations and maintain a viable industry, a number of issues must be addressed.

Differences exist between sport anglers and commercial fishermen over management efforts to divide potential yield. The resolution of these differences could result in truly cooperative fishery management. Commercial fishermen will be encouraged to continue to work co-operatively to manage district fish populations.

Also needed is some method of assessing the dumping of incidentally caught non-quota species, over-quota species and species of no commercial value in order to properly measure total harvests.

3.4 BAITFISH MANAGEMENT

- **Objective:**
  To manage local baitfish stocks to maintain a viable commercial industry consistent with stable baitfish populations.

- Target:
  To maintain an average harvest of 4,400,000 dozen (144,100 kg) baitfish a year.

3.4.1 Discussion

Current management theory is to consider the present harvest of 144,100 kg per year to be the potential yield level, to issue no new licences, to improve harvest assessment of the industry and the angling public and to develop more accurate assessment of the baitfish harvest potential. Concurrent management direction will be toward defining essential habitat requirements of baitfish and protecting that habitat from degradation.

3.5 RARE OR ENDANGERED FISH SPECIES MANAGEMENT

- **Objective:**
  To prevent the extinction of any native fish species.

- Target:
  To protect those native fish species occurring in the Niagara District whose numbers are considered low enough that exploitation might eliminate them from the district and to protect their habitat.

3.5.1 Discussion

One species, the blue walleye (blue pickerel) identified as having occurred in the Niagara District has been confirmed as extinct by the Committee on the Status of Endangered Wildlife in

Canada (COSEWIC). Other species occurring in the Niagara District and being considered by COSEWIC for a rare or endangered status include the bluntnose minnow, the grass pickerel and the green sunfish. Other fish species are considered to be locally rare (to Niagara District).

The brook trout population of the upper Twelve Mile Creek is the only known self-sustaining native population in the Niagara Peninsula. Muskellunge are concentrated mainly in the upper Niagara River, have been reduced in numbers in the Niagara waters of Lake Erie, and apparently eliminated from the Grand River. A small isolated breeding muskellunge population may occur in Gravelly Bay, Port Colborne. Lake sturgeon occur in vestigial numbers in Niagara District waters of Lakes Erie and Ontario and the Niagara River and occurred historically in the Grand River.

While all pertinent legislation will continue to be actively enforced, efforts will also be directed to updating existing records as well as protecting those species classed as threatened, rare or endangered.

3.6 MANAGEMENT STRATEGIES AND TACTICS

The following strategies and related tactics have been selected for each fish community and management area, where appropriate, as the means of achieving fishery targets, but are not necessarily written in order of priority:

3.6.1 Information Transfer To and From the Resource Users:

- Pursue the idea of establishing an M.N.R. public forum with meetings for information exchange on topics such as M.N.R. management direction, public input, topics for public education seminars, and etc.

- Seek public involvement before making important fisheries management decisions, achieved via media advertising, public meetings and consultation with interest groups.

- Sponsor seminars and workshops for special interest groups such as civic leaders and employees, planners, developers, farmers, sportsmen, etc. to develop an appreciation of the problems faced by each user group and to find mutually agreeable methods of resolution within the bounds of acceptable fisheries management practices.

- Promote ecological awareness in schools through the use of fish and wildlife resource kits.

- Increase the general public awareness of fisheries resources and their value by advertising and enhancing viewing opportunities during migratory salmonid runs, informing landowners of the economic benefits of maintaining habitat quality so they provide recreational opportunities, informing the public about the importance of shoreline areas in supporting fish habitat and of maintaining healthy forage fish stocks, expanding public understanding of the commercial fishing industry and its role, publicizing the results of local angler surveys and population assessment studies, preparing and distributing a brochure which summarizes local fisheries information, preparing and publicizing results of rare or endangered species status reports, creating habitat improvement or interpretive demonstration areas, offering guided tours to groups of fish viewing areas or demonstration areas, supporting public awareness and research efforts by other agencies and groups and by advising property owners of their obligations under the Canada Fisheries Act to protect fisheries and fish habitat from their own actions to develop or improve their property or from impacts arising from the use of their property.

- Continue consultation with the commercial fish industry on matters of mutual concern such as status of stocks, quotas, conflicts with anglers, and general fisheries management.

- Continue consultation with the bait fish industry concerning status of stocks, allowable harvest, fishing locations, non-industry harvest of stocks, limiting entry into the fishery and supporting commercial bait fish culture.

- Participate with Main Office personnel and Federal Officials in negotiations with Native Peoples re fishing agreements in the Niagara District.

- Describe and encourage angling in under-utilized waters.

- Encourage and assist local conservation authorities and municipalities to produce or revise fishing brochures that will advertise locations and fishing conditions at under-utilized areas.

- Support fishing derbies on under-utilized waters and encourage harvest and use of all fish caught.

- Develop a series of brochures or a booklet for public distribution containing recipes for the preparation of under-utilized species.

- Annually conduct creel census on a number of selected waters to determine species sought by, and level of satisfaction of, the angling public.

- Continue discussions at the local level between staff of O.M.N.R. and N.Y.D.E.C. concerning management of boundary waters, particularly the Niagara River.

3.6.2 Maintenance and Improvement of Access

- Encourage municipalities, Ministry of Transportation and marina operators to post directional signs to existing marinas and boat launching sites from major highways and arterial roads.

- Investigate a variety of incentives to encourage landowners to make their property available to anglers.

- Investigate the feasibility of land easements to open up major fisheries now closed to public access.

- Update access point information and assess suitability of the sites and their potential for development.

- Assess site utilization during major fisheries events such as opening season dates and derbies to estimate supply of and demand for access.

- Encourage municipalities and the private sector to develop the access sites with the greatest potential and the most demand.

- Assess the suitability of creating artificial reefs to concentrate fish thus making them more accessible to the angler.

- Encourage the development of fishing piers to improve access to the fisheries resources of the Great Lakes and other suitable waters.

- Consider standardizing boundary water fishing laws, particularly on the Niagara River.

- Promote high standards of ethics emphasizing respect for private property and to control litter.

3.6.3 Identification, Development and Maintenance of Preferred Fish Community Species Structure

- In inland waters update stream and pond survey information to establish current community species structure, productivity and estimated annual potential yield.

- Establish index stations for fish population study at representative sites on selected streams as part of updating stream fish population inventories. The cycle of such studies will depend on levels of funding and/or manpower.

- Establish a rotational schedule of annual creel surveys for all waters to determine angler effort, angler harvest, an index of fish community species structure and trend through time information.

- Continue to monitor the commercial fish harvest by monthly return audit and reconciliation, verified by commercial fish catch sampling and on-board observation for estimates of community species structure and total harvest.

- Maintain the current commercial fish quota system for management based on annual year class strength assess- ment, harvest history and in consultation with industry personnel.

- Maintain the current baitfish harvest assessment of the commercial sector using monthly and annual returns while seeking to improve validation techniques.

- Expand the creel data base by asking anglers to estimate baitfishing activities by amount and location to improve estimates of baitfish utilization.

- Ensure that fish agreements negotiated with Native Peoples are compatible with the protection, maintenance and enhancement of a desirable fish species community structure.

- Using current community species structure, habitat analysis and angler preferences, assess the practicality and desirability of managing specific waters for preferred species and make the final decisions subsequent to public consultation.

- Establish, as required, additional smallmouth bass spawning site sanctuaries on the Lake Erie shoreline to protect spawning bass and aid reproductive success.

- Support the Federal Government's sea lamprey control program by ensuring proper mitigation in proposed fish pass structures.

- Investigate the effect of water control structures in the mouths of Lake Erie tributary drains on northern pike spawning runs and determine if removal or mitigation is necessary, possible and practical.

- Continue efforts to resolve fish migration problems caused by Grand River dams by supporting sportsmen's efforts with Community Fisheries Involvement Program walleye hatchery, determining the compatibility of Thames River walleye stocks with Grand River stocks, and developing means of ensuring fish passage past the dams while excluding sea lamprey if required.

- Continue to support the Lake Ontario salmon fishery by stocking up to 150,000 chinook and 50,000 coho per year.

- Continue to support the Lake Ontario brown trout fishery by stocking up to 70,000 brown trout per year.

- Continue to support the Community Fisheries Involvement Program rainbow trout/brown trout streambank incubator project at the DeCew Falls water treatment plant producing rainbow trout for the St. John's Conservation Area pond and brown trout for suitable sections of Twelve Mile Creek.

- Continue protection for rare or endangered fish species such as lake sturgeon, bluntnose minnow, grass pickerel, green sunfish and local native populations of brook trout.

- Prohibit stocking of hatchery-reared trout of unsuitable strain in sections of Twelve Mile Creek identified as supporting or suitable for native wild brook trout populations.

- Transfer wild brook trout from Twelve Mile Creek populations to other suitable headwater sections of the same creek that lack an established population.

- Pursue the establishment of a Community Fisheries Involvement Program streambank incubator to improve the reproductive success of the Twelve Mile Creek brook trout fishery.

- Ensure adherence to the requirement for a fish transfer permit from the Ministry of Natural Resources to control fish stocking done by the private sector.

- Pursue the establishment of suitable additional Community Fisheries Involvement Program projects proposed by interested public or private groups to enhance fish populations.

- Reduce illegal harvest of trout and salmon during spawning runs in Lake Ontario tributaries.

3.6.4 Identification, Protection and Enhancement of Essential Fisheries Habitat (Including Water Quality)

- Update lake, stream and pond survey information to catalogue type, quality and availability of fish habitat as part of fish species survey project.

- Develop habitat rehabilitation prescriptions based on survey results and seek funding for remedial work.

- Establish a schedule for updating inventories on lake, stream and pond fish habitat so that information is current, trend information can be developed and the success of remedial work can be assessed.

- Survey and map the Lake Ontario, near shore littoral zone to catalogue type, quality and availability of fish habitat.

- Survey and map the Lake Ontario near-shore littoral zone to catalogue type, quality and availability of fish habitat.

- Update Lake Erie near-shore littoral zone survey and mapping as an indicator of shoreline dynamics in response to water level changes, storms, ice and developmental pressures.

- Continue Grand River habitat assessment, with particular regard to suitability for northern pike, smallmouth bass, largemouth bass and muskellunge.

- Encourage and utilize voluntary assistance in performing routine fisheries management duties. (Example: Deputy Conservation Officers or fish and game clubs to conduct habitat assessment of specific waters).

- Encourage and support voluntary assistance for habitat rehabilitation of specific waters with Community Fisheries Involvement Program funds or other special monies.

- Maintain, enhance and protect existing fisheries habitat, forest cover and wetland areas through plan input and review, encouraging by-law enforcement, Fisheries Act enforcement and by landowner contact through the M.N.R. forestry extension service and other allied programs, thereby implementing the Federal Department of Fisheries and Oceans policy for the management of fish habitat, including the principle of "no net loss of fish habitat" and to strive for a net gain.

- Require a section on environmental protection of aquatic habitat (lake shore, river and stream banks, and wetlands) to be included in all development plans as appropriate received for review, with particular regard for erosion control, vegetative buffer maintenance, storm water management and sewage effluent release pursuant to the Canada Fisheries Act, Section 5, subsection (2) and Section 31, subsection (1).

- Implement a dam removal/modification program with due regard to sea lamprey control as appropriate, by approaching dam owners, providing information and seeking agreement for the necessary remedial action (use the Canada Fisheries Act, Section 20, Subsections (1) through (10) as a last resort as necessary to require the instal- lation of an appropriate, effective fish pass).

- Promote the Design and Construction Guidelines for Work Under the Drainage Act (Ontario Ministry of Agriculture and Food 1981) and the Guidelines on the Use of Vegetative Buffer Zones. To Protect Fish Habitat In An Urban Environment (M.N.R., 1987a) while at the same time supporting drainage management that encourages water infiltration to the water table, or other subsurface temporary storage and controlled release, rather than rapid surface removal.

- Increase participation in joint projects with landowners and other government agencies to control soil erosion. Example projects include drop culverts to halt gully erosion French drains to remove silt, bank seeding and rip-rap to alleviate bank erosion and grassed waterways and buffer strips to stop sheet erosion.

- Identify and document significant point sources of excessive nutrient loading and other forms of pollution encountered while performing routine field duties. Liaise with the Ministry of the Environment to initiate clean-up.

- Continue to enforce existing legislation to protect fish habitat.

- Support public or private reforestation projects on the banks of streams as a soil conservation method.

- Develop landowner agreements for remedial works such as fencing against cattle on the edges of rivers and streams.

- Support and encourage the Ministry of Environment's efforts to control and reduce contaminant inputs into the aquatic environment. Particular attention should be given to the Niagara, Grand and Welland Rivers. Collect fish species for contaminant testing as required to monitor cleanup progress on

these waters, and on other district waters where collections could aid in the identification of other problems.

- Participate with the Ministry of the Environment. Environ-ment Canada and public interest groups in the production and application of the Niagara River Remedial Action Plan.

4.0 IMPLEMENTATION

4.1 METHODS

Strategies identified in this Fisheries Management Plan will be implemented through:

- Preparation of five-year implementation schedules;
- Programs and projects approved and funded under the Ministry of Natural Resources work planning process;
- Input to or participation in other programs carried out by the Ministry of Natural Resources or local conservation authorities;
- Review of work plans and proposals from municipalities, private landowners and other government agencies;
- Co-operative efforts with local clubs, associations and municipalities.

4.2 IMPLEMENTATION SCHEDULE (1989 - 1993)

This section outlines proposed fisheries management activities for the five-year period of 1989-1993 in the Niagara District and the balance of Lake Erie commercial fishing zone O-E 5.

Projects to be undertaken in that time have been identified according to those which can be completed under the existing level of funding and those which would require additional funding.

Many of these management activities initiated under current funding levels would be completed by permanent staff supplemented by seasonal employees and clerical support staff and in co-operation with local clubs and organizations. Where possible, contracting out of specific projects to the private sector will continue. The prioritization of different programs has been indicated because sequence is important and, in most cases, data is required by a specified date.

Generally, fisheries management programs over the next five-year period will focus on public consultation, inventory, assessment and rehabilitation. Inventory and assessment will normally precede rehabilitation as the second cannot proceed without the first. The base line gained by initial assessment is also required to measure rehabilitation success.

Assessment is also required to fulfill commitments established for commercial fish quota management and for baitfish resource management.

Pending additional funding, a number of aquatic habitat inventory programs would be undertaken.

Efforts to improve access to the Grand River by migrating warmwater fish will continue. Major stocking efforts in Lake Ontario will also continue. Although stocking assessment will be given a high priority additional funding is required to implement comprehensive programs.

Routine planning and administrative functions have not been included in this implementation schedule. Enforcement activities related to fisheries management may require revision upon completion of a detailed district enforcement plan.

Projects which relate to specific management strategies and tactics not identified in the first implementation schedule will be identified and prioritized in subsequent implementation schedules.

The next scheduled revision to this plan is for completion in 1994. Work on that revision should commence during 1992.

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies At Existing Funding Level	List of Sites or Water Bodies With Additional Funding	Comments
Information transfer to and from resource users	1. Pursue the idea of establishing an N.M.R. public forum with meetings for information exchange on topics such as: -N.M.R. management direction -public input -topics for public education seminars and etc.	All district waters		Should include representation from sports fishermen, commercial fishermen, bait fisherman, Chamber of Commerce, Tourism Community, M.O.E., O.M.A.F., F.O.N. academic community, Regional Planning Departments and Land Development Industry
	2. Seek Public involvement before making important fisheries management decisions, achieved via media advertising, public meetings and consultation with interest groups		As required for all district waters	
	3. Sponsor seminars and workshops for special interest groups such as civic leaders and employees, planners, developers, farmers, sportsmen, etc., to develop an appreciation of the problems faced by each user group and to find mutually agreeable methods of resolution within the bounds of acceptable fisheries management practices	One per year	2-3 additional seminars/year	
	4. Promote ecological awareness in schools through the use of youth education programs	-Project "wild" -Approach schools to offer our services -Fish and wildlife resource kit -Use a "teach the educator" strategy	Approach school boards and provide more assistance when required	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	5. Increase general public's awareness of fish resources and their value	News releases to promote the following areas: Jordan Port Dalhousie Lock 1, Welland Canal Dunnville Dam	Develop O.M.N.R. publications and presentations	
	-Advertising and enhancing -Viewing opportunities during migratory salmonid runs			
	-Informing landowners of the economic benefits of maintaining habitat quality so so they provide recreational opportunities	News releases	As above	
	-Informing public about the importance of shoreline areas in supporting fish habitat and	News releases	As above	
	of the importance of maintaining healthy forage fish stocks	News releases	As above	
	-Expanding public understanding of the commercial fishing industry and its role	News releases	As above	
	-Publicizing results of local angler surveys and population assessment studies		As above	
	-Preparing and distributing a brochure which summarizes local fisheries information		As above	
	-Preparing and publicizing results of status reports on rare or endangered species		In conjunction with other services - ex parks or timber or CAs or with private landowners on demand	
	-Creating habitat improvement or interpretive demonstration areas			
	-Offering guided tours to organized groups of fish viewing areas ir habitat demonstration or interpretive areas			Scouts, guides, school classes,

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	-Supporting public awareness and research efforts by other agencies and groups and by advising property owners of their obligations under the Canada Fisheries Act to protect fisheries and fish habitat from their own actions to develop or improve their property or from impacts arising from the use of their property	Provide technical assistance on request		F.O.N., O.M.A.F., M.O.E., local naturalist groups, universities,
	6. Continue consultation with the commercial fish industry on matters of mutual concern such as status of stocks, quotas, conflicts with anglers, and general fisheries management	At current level	Increased level of consultation	
	7. Continue consultation with the bait fish industry concerning status of stocks, allowable harvest, fishing locations, non industry harvest of stocks, limiting entry into fishery and supporting commercial bait fish culture	At current level	Improved level of consultation	
	8. Participate with main office personnel and Federal officials in negotiations with Native Peoples re fishing agreements in the Niagara District		1. Six Nations 2. Mississauga	
	9. Describe and encourage angling in underutilized waters	News release	Revised district fishing brochure	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	10. Encourage and assist local conservation authorities and municipalities to produce or revise fishing brochures that will advertise locations and fishing conditions at underutilized areas	Provide technical Assistance		
	11. Support fishing derbies on underutilized waters and encourage harvest of all fish caught		Provide assistance upon request	
	12. Develop a series of bochures or a booklet for public distribution containing recipes for the preparation of underutilized species		Brochures to be produced	
	13. Annually conduct creel census on a number of selected waters to determine species sought by, and level of satisfaction of, the angling public	some waters June 1 to End of August	Year 1 - Lake Ontario, Lower Niagara Year 2 - Lake Erie, Upper Niagara Year 3 - Grand River and selected other inland waters (see appendix II for priority list) Year 4 - Fall and winter creel - Jordan Harbour, Port Dalhousie, Martindale Pond, Upper and Lower Niagara, Lake Erie Haney's Bend (Welland Canal) Year 5 - Year long, district wide creel of all waters (April thru March inclusive)	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies At Existing Funding Level	List of Sites or Water Bodies With Additional Funding	Comments
	14. Continue discussions at the local level between staff of O.M.N.R. and New York D.E.C. concerning management of boundry waters particularly the Niagara River	Niagara River and areas of Lake Erie and Lake Ontario proximal to both Ontario and New York		
Maintenance and Improvement of Access	15. Encourage municipalities, M.T.C., and operators to post directional signs to existing marinas and launch sites from major thoroughfares and arterial roads	Q.E.W. to St. Catharines Grimsby Jordan Harbour Queenston Niagara Parkway Highway 3 to Fort Erie Port Colborne Dunnville Port Maitland Highway 20 Highway 406 Highway 55 Highway 405 Highway 6 Highway 56	Shared cost	
	16. Investigate a variety of incentives to encourage landowners to make their property available to anglers		Appropriate areas need identification	
	17. Investigate the feasibility of land easements to open up major fisheries now closed to public access		Appropriate areas need identification	Pending results of supply and demand surveys

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies At Existing Funding Level	List of Sites or Water Bodies With Additional Funding	Comments
	18. Update access point information and assess suitability of the sites and their potential for development		Additional funding required	
	19. Assess site utilization during major fisheries events such as opening season dates and derbies to estimate supply and demand for access	In conjunction with creel		
	20. Encourage municipalities and the private sector develop access sites with the greatest potential and the most demand	Dependent on results of previous Tactics, 18 & 19, by publicizing results		
	21. Assess the suitability of creating artificial reefs to concentrate fish thus making them more accessable to the angler		Feasibility study required	
	22. Encourage the development of fishing piers to improve access to the fisheries resources of the Great Lakes and other suitable waters		Feasibility study required	
	23. Consider standardizing boundry water fishing laws, particularly on the Niagara River	Initiate move to common regulations		
	24. Promote high standards of ethics emphasizing respect for private property and to control litter litter	Field contact and news releases where applicable	Expand existing programs	

Table 3 IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
Identification development and maintenance of a preferred community species structure	25. In inland waters update stream and pond survey information to establish current community species structure, productivity and estimated annual potential yield	One or two per year of ponds, but no streams (See appendix two for priority listing)	All in five years	
	26. Establish index stations for fish population study at representative sites on selected streams as part of updating stream fish population inventories		Subject to the completion of Tactic 25	
	27. Establish a rotational schedule of annual creel surveys for all waters to determine angler effort, angler harvest, an index of fish community species structure and trend through time information	In conjunction with creel census studies in Tactic 11	In conjunction with Tactic 11	
	28. Continue to monitor the commercial fish harvest by monthly return audit and reconciliation, verified by commercial fish catch sampling and on-board observation for estimates of community species and total harvest	Lake Erie current harvest assessment- specifically catch sampling is insufficient Lake Ontario - not done Grand River - no sampling	Better assessment greater reliability better management	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	29. Maintain the current commercial fish quota system for management based on annual year class strength assessment, harvest history and in consultation with industry personnel	Quality dependant on Tactic 28 District co-operates with lake management committees		
	30. Maintain the current baitfish harvest assessment of the commercial sector using monthly and annual returns while seeking to improve validation techniques	Monthly - on Niagara River only	All bait fishing licences	
	31. Expand the creel data base by asking anglers to estimate their bait fishing activities by amount and location to improve estimates of total bait fish utilization	Incorporate with creel census in Tactic 13		
	32. Ensure that fishing agreements negotiated with Native peoples are compatible with the protection maintenance and enhancement of a desirable fish species community structure		Funding required as for Tactic 8	
	33. Using current community species structure, habitat analysis and angler preferences assess the practicality and desirability of of managing specific waters for preferred species and make the final decisions subsequent to public consultation		Depends on results of three assessment programs in Tactics 13, 25 and 48	

Table 3 IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	34. Establish, as required, additional smallmouth bass spawning site santuaries on the Lake Erie shoreline to protect spawning bass and aid reproductive success	One site intensively surveyed/year 2 partially, Lake Erie -fronting Fort Erie -west of Port Colborne (in future)		
	35. Support the Federal Government' sea lamprey control progran by ensuring proper mitigation in proposed fish pass structures	As required		
	36. Investigate the effect of water control structures in the mouths of the Lake Erie tributary drains on northern pike spawning runs and determine if removal or mitigation is necessary (or possible) and practical		Conduct spawning and impact studies	
	37. Continue efforts to resolve fish migration problems caused by the Grand River dams by supporting sportsmen's efforts with C.F.I.P. walleye hatchery, determining the compatability of Thames River walleye stocks with Grand River stocks and developing means of ensuring fish passage past the dams while excluding sea lamprey if required	Co-operate with Fort Erie - Port Colborne Dunville Walleye Hatchery Committee	Adult walleye transfers Thames to Grand it compatible	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies At Existing Funding Level	List of Sites or Water Bodies With Additional Funding	Comments
	38. Continue to support the Lake Ontario salmon sports fishery	Stock 150,000 chinnook/year 50,000 coho/year		
	39. Continue to support Lake Ontario brown trout fishery	Stock 70,000 brown trout/year		
	40. Continue to support the Community Fisheries Involvement Program rainbow trout/brown trout streambank incubator project at the Decew Falls water treatment plant	St. Catharines and district Conservation Club Rainbow trout for St. John's C.A. Pond	Brown trout for 12 Mile Creek at Shorthills Provincial Park	
	41. Continue protection for rare or endangered fish species such as lake sturgeon, bluntnose minnow grass pickerel, green sunfish and local native populations of brook trout	Enforce existing legislation Seek closure of angling season for sturgeon Maintain zero commercial catch quota on sturgeon	Document existing populations as per Tactic 25 Determine critical habitat and protect as per appropriate tactics described under Strategy 3.6.4	
	42. Prohibit stocking of hatchery-reared trout of unsuitable strain in sections of Twelve Mile Creek identified as supporting or suitable for native wild brook trout populations	No hatchery stock in Effingham branch upstream of Effingham Street. No hatchery stock in St. John's branch upstream of Holland Road at Hollow Road (see Tactic 40)		

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	43. Transfer wild adult brook trout from Twelve Mile Creek populations to other suitable headwater sections of the same creek that lack an established population		One or Two locations per year -audit success	
	44 Pursue the establishment of a Community Fisheries Involvement Program steambank incubator to improve reproductive success of the Twelve Mile Creel brook trout population		Might be a suitable expansion of the DeCew Falls Hatchery	
	45. Ensure adherence to the requirement for a fish transfer permit from the O.M.N.R. for all fish stocking done by the private sector	Continue current audit role		
	46. Pursue the establishment of suitable additional Community Fisheries Involvement Program projects proposed by interested public or private groups to enhance fish populations		New money required	
	47. Reduce the illegal harvest of trout and salmon during spawning runs to Lake Ontario tributaries (and the Grand River?)	Actively enforce existing legislation		

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies		Comments
		At Existing Funding Level	With Additional Funding	
Identification protection and enhancement of essential fisheries habitat (including water quality)	48. Update lake, stream and pond survey information to catalogue type quality and availability of fish habitat	Concurrently with population surveys see Tactic 25		
	49. Develop habitat rehabilitation perscription based on survey results and seek funding for remedial work		Subject to completion of Tactics 13, 24 and 48	
	50. Establish a schedule for updating inventories on lake, stream and pond fish habitat so that information is current, trend information can be developed and the success of remedial work can be assessed		As required	
	51. Survey and map the Lake Ontario near shore littoral zone to catalogue type, quality and availability of fish habitat		New Money required	-overdue -as per Savoie and Radford's 1978 survey of Lake Erie shoreline Conduct surveys
	52. Update Lake Erie near-shore littoral zone survey and mapping (Savoie and Radford, 1978), as an indicator of shoreline dynamics in response to water level changes, storms, ice and developmental pressures		New money required	If more than one re-survey is required establish a schedule

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	53. Continue Grand River habitat assessment with particular regard to suitability for smallmouth bass, northern pike, largemouth bass and muskellunge		Suitable for contracting to private sector or university	
	54. Encourage and utilize voluntary assistance in performing routine fisheries management duties (eg. D.C.O.s) or fish and game clubs to conduct habitat assessment of specific waters		Community Fisheries Involvement Program	
	55. Encourage and support voluntary assistance for habitat rehabilitation of specific waters with Community Fisheries Involvement Program funds, or other special monies		As above Requires prescription see Tactic 48	
	56. Maintain enhance and protect existing fisheries habitat, forest cover and wetland areas through plan input and review, encouraging by-law enforcement, Fisheries Act enforcement and by landowner contact through the M.N.R. forestry extension service and other allied programs, thereby implementing the federal Department of Fisheries and Oceans policy for the management of fish habitat, including the principle of "no net loss of fish habitat", and to strive for a net gain	-Plan review -Wetland inventory	Landowner contact M.I.A. Ansi programs Private land forestry Extension service	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies At Existing Funding Level	List of Sites or Water Bodies With Additional Funding	Comments
	57. Require a section on environmental protection of aquatic habitat (lake shore, river and stream banks and wetlands) to be included in all development plans, as appropriate, received for review, with particular regard for erosion control, vegetative buffer maintenance, storm water management management and sewage effluent release	Pursuant to the Canada Fisheries Act, Section 5(2) and 31(1)		
	58. Implement a dam removal modification program with due regard to sea lamprey control as appropriate, by approaching dam owners, providing information and seeking agreement for the necessary remedial action		This requires a prescription as per Tactic 49 Seek support money for redevelopment	Use the Canada Fisheries Act Section 20(1) to to 20(10) as a last resort, as necessary to require the installation of an appropriate, effective fish pass
	59. Promote the Design and Construction Guidelines for Work Under the Drainage Act (Ontario Ministry of Agriculture and Food, 1981) and the Guidelines on the Use of Vegetative Buffer Zones To Protect Fish Habitat in an Urban Environment (O.M.N.R., 1987) while at the same time supporting drainage management that encourages water infiltration to the water table or other subsurface temporary storage with controlled release rather than rapid surface removal	-News release and input into local planning	Land owner contact Community Fisheries Involvement Program or other monies	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies: At Existing Funding Level	List of Sites or Water Bodies: With Additional Funding	Comments
	60. Increase participation in joint projects with landowners and other government agencies to control soil erosion	Direct farmers to O.M.A.F. grants for erosion control	Encourage non farmers to apply for Community Fisheries Involvement Program grants	
	61. Identify and document significant point sources of excessive nutrients and other forms of pollution encountered while performing routine inventory and assessment	Liaise with M.O.E. to initiate cleanup		
	62. Continue to enforce existing legislation to protect fish habitat	Continue at present level, as per district enforcement plan	Increased enforcement possible as per district enforcement plan	
	63. Support public or private reforestation projects on the banks of streams as a soil conservation method	News Releases Opportunistic landowner Landowner contact	Organized landowner contract according to priority list Appendix 11	
	64. Develop landowner agreement for remedial works such as fencing against cattle along the edge of rivers and streams		Community Fisheries Involvement Program	

Table 3

IMPLEMENTATION SCHEDULE, 1989 - 1993, Niagara District

Strategies	Associated Tactics	List of Sites or Water Bodies		Comments
		At Existing Funding Level	With Additional Funding	
	65. Support and encourage M.O.E. efforts to control and reduce contaminant inputs into the aquatic environment	1 or 2 waters/year fish samples for contaminant analysis Niagara River Welland River Lake Ontario Lake Erie Other inland waters	More intensive sampling	Certain logistical problems need to be resolved in obtaining adequate Niagara River samples
	66. Participate with the Ministry of the Environment, Environmental Canada and public interest groups in the production and application of the Niagara River Remedial Action Plan		Requires funding	

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GLOSSARY

Angler-Day

A measure of fishing effort or activity which is equivalent to the average fishing trip length for a particular water area and is used to convert angler hours determined by creel census to angler-days of opportunities. The mean length of angler trips used to determine angler-days for this document are:

Mean Trip Length
(Number of Angler Hours Equivalent To One Angler-Day)

Water Area	Boat Fishing	Shore Fishing
Lake Ontario	6.02	3.65
Lower Niagara River	5.15	3.67
Upper Niagara River	3.59	3.51
Lake Erie	4.62	4.13
Grand River	3.16	3.90
Other Inland Waters	4.24	3.67

Angler-Hour

A measure of fishing effort or activity and represents one hour of active fishing by one angler.

Artificial Fishery

A fishery which is maintained entirely through plantings of hatchery reared fish in order to provide angling opportunities.

Baitfish

Any fish that are legally harvested by the commercial baitfish industry and as defined by the Game and Fish Act.

Coldwater Fish Community

Fish populations comprised primarily of the families Salmonidae (trout and salmon), and Clupeidae (herrings and whitefish). All considered as salmonids in this planning document.

Coldwater Streams

Those streams having characteristics which would support trout or salmon.

Commercial Fish

Any fish that are legally harvested by the commercial fishing industry.

Critical Fish Habitat

Any fish habitat required for the maintenance of a healthy fish population or otherwise identified as essential to the achievement of the Ministry's fishery program objectives.

Current Use

A measure of use of the fish resources by key users (e.g., anglers, commercial fishermen, bait harvesters, etc.) and presented as angler-days of fishing effort and kilograms of fish harvested for the sport fishery, kilograms of fish harvested for the commercial fishery, and dozens of baitfish harvested by the bait fishery.

Fish Community

A combination of different fish species living and interacting together in the same body of water.

Goal

A general purpose to which the Ministry aspires.

Management

The judicious use of means to achieve ends. Management may have various levels of intensity.

Non-Resident

An angler whose principle residence is outside of Ontario.

Objective

A quantifiable and attainable end, which the Ministry's efforts are intended to accomplish. The "target" is a quantifiable part of the objective.

Opportunity

A measure of recreation supply which is used to describe the number of times a resource or facility can be used (occasions of use) in a given time period. An opportunity is considered not to be greater than one day.

Pacific Salmon

Pacific salmon includes coho salmon, chinook salmon, kokanee salmon, pink salmon and any member of the genus Orchorhynchus.

Potential Yield
The amount of flesh of a particular fish species that can be removed annually from the water without exhausting the ability of the species to

sustain itself. The term is analogous to allowable yield, maximum allowable harvest, and biologically allowable harvest.

Projected Use

The projected use represents the estimated amount of fish required to satisfy the wants of all fish users at the year 2000.

Rehabilitation

This term may be applied to both fish populations and fisheries habitat. In both instances rehabilitation denotes efforts to enhance or restore a degraded or stressed situation to its original condition.

Resident

An angler whose principle residence is in Ontario.

Southern Ontario

The southern Ontario planning region includes the following districts: Algonquin Park, Aylmer, Bancroft, Bracebridge, Brockville, Cambridge, Carleton Place, Chatham, Cornwall, Huronia, Lindsay, Maple, Minden, Napanee, Niagara, Owen Sound, Parry Sound, Pembroke, Simcoe, Tweed and Wingham.

Sportfish

Any fish that are legally caught by angling.

Strategy

Planned actions or measures to achieve a desired end.

Tactic

A method devised to achieve one or more strategies.

Target

A quantified end to be achieved or completed by a specific date.

Warmwater Fish Community

Fish populations composed primarily of non-salmonid species. Within Niagara District, this includes the following: smallmouth, largemouth, and rock bass, sunfish, crappie, carp, suckers, catfish, bullheads, white bass, white perch, northern pike, yellow perch, walleye and rainbow smelt, plus any others that are not salmonids.

Warmwater Streams and Ponds
Those streams and ponds having characteristics which would support warmwater fish communities.

APPENDIX I

Addendum to the Niagara District
Fisheries Management Plan
Background Information

Introduction

Between the time the background information for the production of the district fisheries management plan was compiled and the actual work of writing the plan commenced, several changes occurred requiring revision of the background information. These changes are:

1. Assigning the fisheries information and the planning area of the lower Niagara River to Lake Ontario.

2. Assigning the fisheries information and the planning area of the upper Niagara River to Lake Erie.

3. Increasing the Lake Erie area under consideration in the Niagara District Fisheries Management Plan to include all of commercial fish statistical district 5 (O-E 5) ie; part of the Lake Erie waters of the Simcoe M.N.R. District, Southwestern Region, thereby increasing the data base area by over 150%.

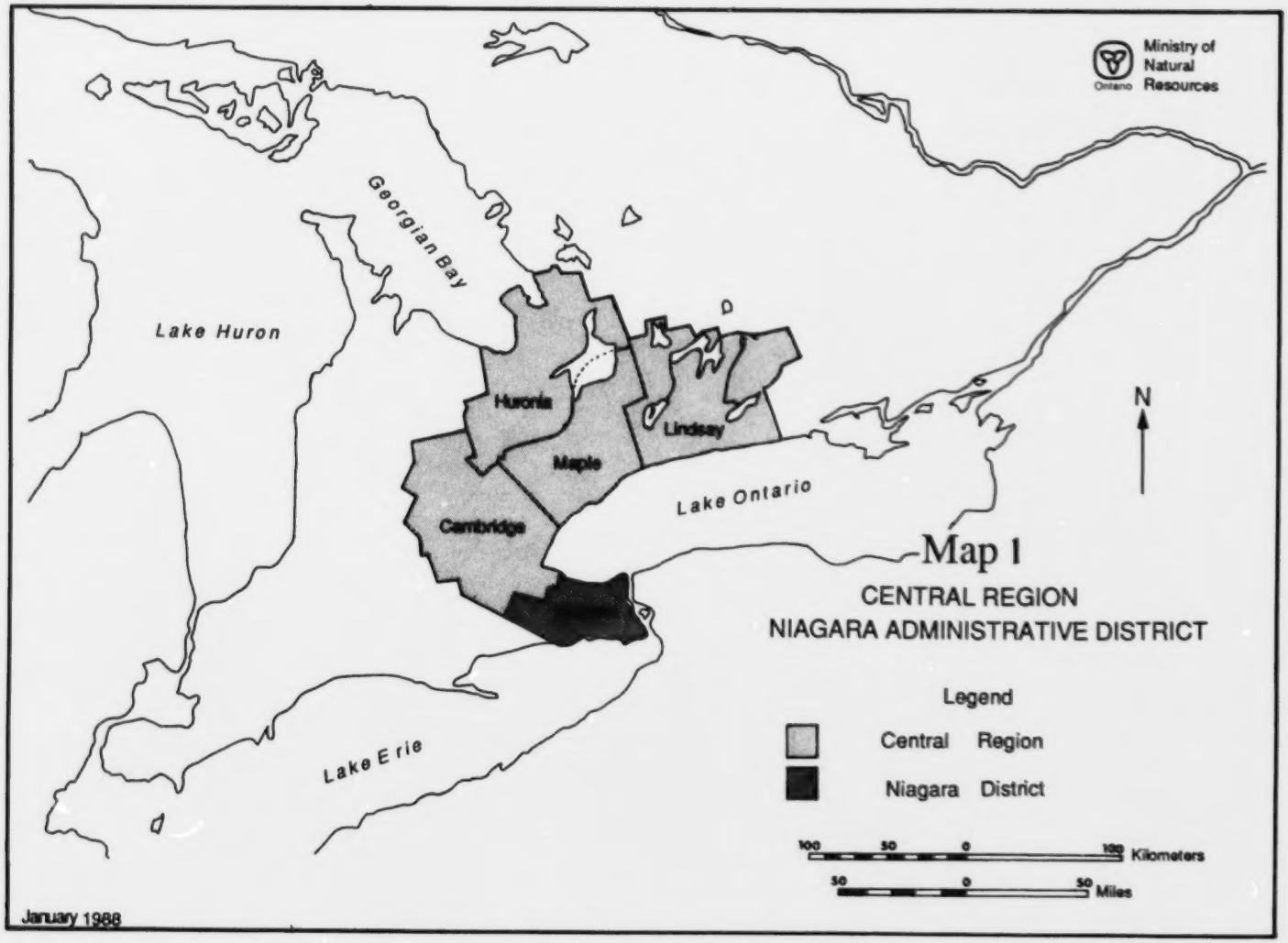
4. Changing the lake productivity, potential harvest and recreational supply figures for Niagara District waters of Lake Ontario from those developed using local historical data to those developed using whole lake data analysis, and considering the development of the salmonid fishery on the lake over the past several years. This later analysis was completed in February, 1987.

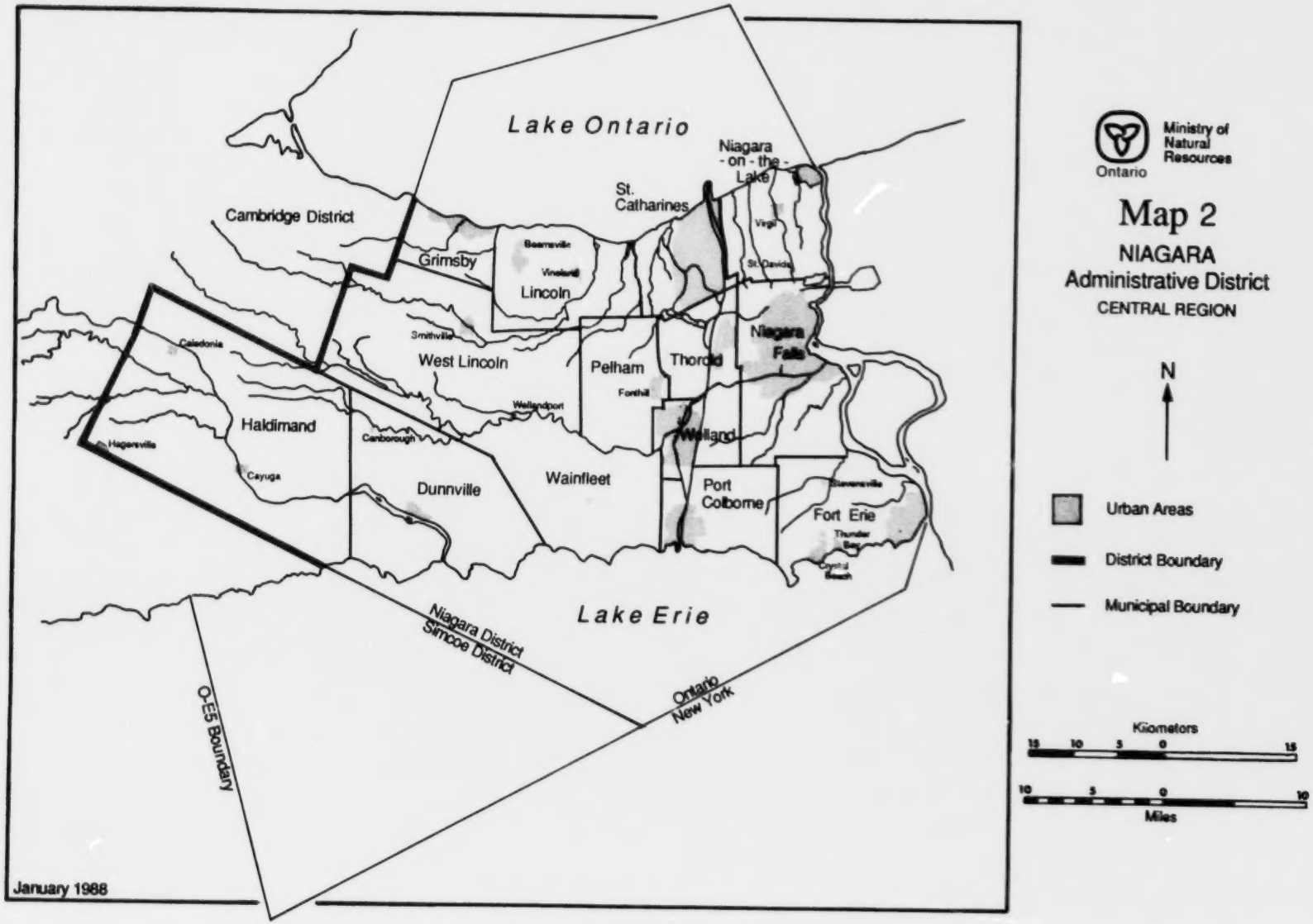
Rather than totally rewrite the plan background information document, repeat open houses and review procedures up to the actual plan preparation stage, this addendum will update the information.

Methods

The addendum contains two maps and three tables which outline the original parameters, revisions to the information and final figures. Map 1 shows the Niagara District in the Central Region setting. The extended planning area for Lake Erie is graphically displayed in Map 2.

Changes in the background information are limited to Lake Ontario, the Niagara River and Lake Erie. The information base for the Grand River and "Other Inland Waters" remains unchanged from the Background Information and Optional Management Strategies, Niagara District Fisheries Management Plan, 1986-2000.


Ministry of Natural Resources
Ontario
Georgian Bay
Lake Huron
Huronia
Lindsay
Maple
Cambridge
Lake Ontario
Lake Erie
N
Map 1
CENTRAL REGION
NIAGARA ADMINISTRATIVE DISTRICT
Legend
Central Region
Niagara District
100 50 0 100 Kilometers
50 0 50 Miles
January 1988



Ministry of Natural Resources
Ontario

Map 2

NIAGARA
Administrative District
CENTRAL REGION

N

Urban Areas

District Boundary

Municipal Boundary

Kilometers
15 10 5 0 15

10 5 0 10
Miles

Discussion

Table 1

Table 1 shows the original and revised information for the three areas requiring adjustment. The Niagara River information was partitioned into lower and upper river components with the lower river data assigned to Lake Ontario and that for the upper river assigned to Lake Erie.

The Lake Ontario area was increased by 10 percent. The estimated annual allowable harvest and current harvest were increased by 450 and 300 percent respectively. Since the warmwater sport fishery and the commercial fisheries have been assumed to have remained stable, these increases of harvest are due solely to the expansion of the salmonid population and increased angling for these species.

Estimates for current Lake Ontario angling recreation have been increased by 130 percent because of increased fishing for salmon.

Lake Ontario has the capability of supplying 204,100 angling occasions which is an increase of 365 percent over the previous estimate. By the year 2000 the lake will likely be supplying 110,000 angler occasions or an increase of 150 percent over the current level and 54 percent of its potential.

Baitfish and commercial food fish harvest is expected to stay relatively constant on Lake Ontario. Baitfish harvest is considered to be at its allowable level. Commercial food fish harvest is regulated by quota and is presently at its long term average, also considered its allowable level.

Lake Erie area was increased from 57,400 hectares to 169,900. Because of the inclusion of the upper Niagara river into the Lake Erie planning area the increase in area is 185 percent.

Estimates of current fish harvest and allowable harvest from this planning area of Lake Erie increased the values by 400 and 86 percent respectively.

The main factor influencing the increase of the current harvest estimate is the commercial food fish industry which is believed to have the bulk of its harvest from the Simcoe District share of O-E 5. Since commercial fish harvests fluctuate around an average value and are currently above average the demand and allowable harvests are both lower than the current harvest.

The bulk of the baitfish harvest is obtained from the Niagara River. Since very little Lake Erie shoreline has been added to the district planning area, no additional baitfish has been added to the estimates of current or potential harvest. Because of information gaps in the under

Table 1. Niagara District Fisheries Management Plan
Background Information
Comparison of Original and Revised Data Base

		Lake Ontario		Lake Erie		Niagara River			
		Original	Revised	Original	Revised	Original Total	Lower	Upper	Revised
Area (ha)		76,000	83,600	57,400	169,000	2,530	510	2,020	**
Current Harvest	Sport kg.	8,400	164,000	49,600	76,000	38,000	20,900	17,100	
	Bait	200	200	7,600	113,500	105,900	-	105,900	
	Commercial	16,600	16,600	92,500	1,172,700	-	-	-	
	Total	25,200	180,800	149,600	1,362,200	143,900	20,900	123,000	
Est. Annual Allowable Harv. kg.		24,200	259,000	246,000	716,500	159,800	23,210	136,600	
Current Angler Recreation (occasions)	Cold water	-	77,400	-	300	-	-	-	
	Warm water	-	20,400	-	105,300	-	-	-	
	Total	18,600	97,800	63,000	105,600	54,300	24,300	30,000	
Fishing Demand by Year 2000									
Sport occasions		19,700	110,000	66,700	121,400	58,900	25,000	34,500	
kg		8,900	187,400	52,700	87,400	43,600	23,900	19,700	
Bait kg		200	200	7,600	113,500	105,900	-	105,900	
Commercial kg		19,100	16,600	89,000	430,400	-	-	-	
Percid Rehabilitation (kg)		-	-	-	85,200	-	-	-	
Total kg		28,200	204,200	149,300	716,500	149,500	23,900	125,600	
Fishing Potential									
Sport occasions		16,900	204,100	110,100	108,400	57,600	24,300	33,300	
kg		7,600	242,200	87,000	101,000	42,200	23,200	19,000	
Bait kg		200	200	12,600	113,500	117,600	-	117,600	
Commercial kg		16,400	16,600	147,000	502,000	-	-	-	
Total kg		24,200	259,000	246,600	716,500	159,800	23,200	136,600	

Lower River Data to Lake Ontario
Upper River Data to Lake Erie

standing of baitfish biology and population dynamics there is a degree of uncertainty inherent in baitfish estimates and an arbitrary, conservative decision was made to consider the current harvest as equivalent to the estimated demand and the allowable harvest resulting in a decrease in these parameters from the original estimates.

Data revision has increased the expected demand for sportfish and sport fishing occasions on Lake Erie by 6.3 and 7.1 percent respectively. Sufficient fisheries resources exist to meet this increased demand.

Table 2

Table 2 demonstrates changes in the species partitioning caused by the expansion of the Lake Ontario salmonid community and the extension of the Lake Erie planning area.

On Lake Ontario salmonids originally accounted for 25 percent by weight of the allowable harvest. This has since increased to approximately 75 percent. This increase in the percentage of salmonids resulted in major percentage declines in other species, except where there were significant contributions from the lower Niagara River, such as for the centrarchids and the "other species" classification.

On Lake Erie major changes in species composition of the estimated allowable harvest occurred for two reasons. One was the suspected species distribution between areas. For example, the estimated allowable harvest for rainbow smelt increased dramatically in the face of declining populations because 99 percent of the actual harvest is estimated to be from the Simcoe District area of Lake Erie commercial fishing zone O-E 5.

Similarly, the very large contribution of baitfish from the upper Niagara River significantly increased representation other these species in the Lake Erie fish community.

The second reason for the change in species composition was improved population levels. As with salmonids in Lake Ontario, percid (mainly yellow pickerel) populations have escalated in the Niagara District Lake Erie planning area.

Table 3

Table 3 contains the revised target testing incorporating the new information for Lakes Ontario and Erie and the existing information for the Grand River and other inland waters. New targets for fisheries have been established based on the allowable harvest or the projected demand, whichever is less.

This analysis indicates that all areas except Lake Erie, will still have surplus fish production by the year 2000. Lake Erie will have no surplus fish production but the demand for fish will not exceed the supply.

Table 2. Niagara District Fisheries Management Plan
Background Information
Revised Species Partitioning

Species Partitioning	Lake Ontario		Lake Erie		Niagara River			
	Original	Revised	Original	Revised	Original Total	Lower	Upper	Revised
Harvest Potential	24,200(100)	259,000(100)	246,600(100)	716,500(100)	159,800(100)	23,200(100)	136,600(100)	**
Baitfish	200(0.8)	200(0.1)	12,600(5.1)	113,500(15.8)	117,600(73.6)	- (0)	117,600(86.1)	
Centrarchids	300(1.2)	4,000(1.5)	46,000(18.6)	63,400(8.8)	14,200(8.9)	2,800(12.1)	11,400(8.3)	
Esocids	0+ (0+)	0+ (0+)	2,700(1.1)	4,800(0.7)	1,800(1.1)	0+ (0+)	1,800(1.3)	
Osmerids	10,900(45.0)	11,500(4.4)	23,700(9.6)	272,000(38.0)	200(0.1)	100(0.4)	100(0.1)	
Percicthyid	2,100(8.7)	7,200(2.8)	23,400(9.5)	16,200(2.3)	5,100(3.2)	4,600(19.8)	500(0.4)	
Percid	2,900(12.0)	10,500(4.0)	96,400(39.1)	228,000(31.8)	4,000(2.5)	2,000(8.6)	2,000(1.5)	
Salmonid	6,100(25.2)	194,000(74.9)	100(0.0)	200(0.0)	13,800(8.6)	13,700(59.0)	100(0.1)	
Other	1,700(7.0)	31,600(12.2)	41,700(16.9)	18,400(2.6)	3,100(1.9)	0+ (0+)	3,100(2.3)	

**Lower River Data to Lake Ontario
Upper River Data to Lake Erie

Table 3. Niagara District Fisheries Management Plan
Background Information
Revised Target Testing

	Lake Ontario		Lake Erie		Grand River		Other Inland Waters		Total	
Fish Available For Targets kg		259,000		716,500		54,100		48,600		1,078,200
Baitfish Potential kg		200		113,500		15,000		15,000		144,100
Balance		258,800		603,000		39,100		33,200		934,100
	cold water	warm water	cold water	warm water	cold water	warm water	cold water	warm water	cold water	warm water
kg	194,000	64,800	200	602,800	-	39,100	-	33,200	194,200	739,900
Reserved For Percid Rehabilitation	-	-	-	85,200	-	-	-	-		85,200
Commercial Quotas kg	-	16,600	-	430,400	-	15,400	-	-	-	462,400
Balance Available	194,000	48,200	200	87,200	-	23,700	-	33,200	194,200	192,300
Angling Quality Standard kg/occ	2.0	0.45	0.67	0.72	-	0.48	-	1.16	-	-
Available Angling Opportunities	97,000	107,100	300	121,100	-	49,400	-	28,600	97,300	306,200
									403,500	
Current Angling Use	77,400	20,400	300	105,300	-	29,800	-	14,200	77,700	169,700
occ.									247,400	
Est. Angling Demand by Year 2000	89,000	21,000	300	121,100	-	32,700	-	17,500	89,300	192,300
occ									281,600	
Niagara District Land Use Guideline Targets to the Year 2000										
Sport Fishing Opportunities									326,000	
Commercial Fish kg									269,000	
Baitfish dozens									4,400,000	
kg									144,100	
Modified Targets Based on Allowable Harvest or Demand, Whichever is the Lesser										
Sportfishing Occasions	88,000	21,000	300	121,100	-	32,700	-	17,500	89,300	192,300
									281,600	
Commercial kg	-	16,600	-	462,400	-	15,400	-	-		462,400
Baitfish kg	-	200	-	113,500	-	15,000	-	15,400		144,100
Sportfish kg	178,000	9,400	200	87,200	-	15,700	-	20,300		310,800

Niagara District's previous and revised fisheries targets for the year 2000 are:

Fisheries Targets

		Previous	Revised
Sportfish Occasions		326,000	281,500
Commercial fish	kg.	269,000	462,400
Baitfish	dozens	4,400,000	4,400,000

The Niagara District's Land Use Guidelines will be revised to match these new targets.

APPENDIX II

Prioritization of Inland Waters Other Than the Grand River with a suggested 5-year cycle of assessment.

Reservoirs and Ponds

Total = 25 — Survey Rate 5/year

Year 1	Priority 1-5. Queenston Reservoir, Martindale Pond, Lake Gibson, Jordan Harbour, Moodie Lake.
Year 2	Priority 6-10. Taquanyah C.A. Pond, Chippawa Creek C.A. Pond, Unnamed Pond (Sherkston Beach), St. John's C.A. Pond, Eagle Marsh.
Year 3	Priority 11-16. Wainfleet Wetlands C.A. Ponds (6).
Year 4	Priority 17-21. Unnamed Ponds (Windmill Point - 2), Virgil C.A. Ponds (2), Indian Lake Campground Pond.
Year 5	Priority 22-25. Steed and Evans Ponds (2), Hollin's Ponds (2).

Tactics:
1. Check files for previous information.
2. Map from aerial photographs and enlarge as necessary.
3. Low level oblique angle photography (small areas) or low level oblique angle video (large areas) by fixed wing aircraft or helicopter as required.
4. Ground truthing and survey as per Aquatic Survey Manual.

Note: All recorded ponds are considered warmwater except St. John's C.A. Pond and Steed and Evans Ponds which are coldwater and Hollin's Ponds which are unknown.

Streams and Drains

Total length of streams and drains to be assessed = 836 km.
Survey Rate = 167 km/year.
Note: All streams and drains are warmwater except the upper reaches of Twelve Mile Creek which are coldwater.

Year 1	Priority 1-2. Welland River (103 km), Twenty Mile Cr. (91 km).
Year 2	Priority 3-5. McKenzie Cr. (69 km), Boston Cr. (44 km), Twelve Mile Cr. (lower reaches, 51 km?)
Year 3	Priority 6-11. Fifteen Mile Cr. (35 km), Sixteen Mile Cr. (32 km), Oswego Cr. (32 km), Twelve Mile Cr. (upper reaches, 25 km), Lyons Cr. (24 km), Rogers Cr. (22 km).
Year 4	Priority 12-22. Spring Cr. Dr. (21 km), North Cr. Dr. (21 km), North Forks Dr. (19 km), Black Cr. (18 km), Four Mile Cr. (16 km), Beaver Cr. (Lk. Erie, 14 km), Big Forks Dr. (13 km), Two Mile Cr. (13 km), Eight Mile Cr. (12 km), Grassy Brook (12 km), Beaver Cr. (Twenty Mile Cr., 12 km).
Year 5	Priority 23-40. Mill Cr. (12 km), Elsie Cr. (12 km), Little Forks Dr. (12 km), Forty Mile Cr. (11 km), Frenchman's Cr. (11 km), Wolf Cr. (11 km), Usshers Cr. (10 km), Holmes Cr. (9 km), Kelly Dr. (8 km), Boyer's Cr. (7 km), Miller Cr. (7 km), Maple Cr. Dr. (6 km), Broad Cr. Dr. (6 km), Six Mile Cr. (5 km), Tee Cr. (3 km), Bakers Cr. (3 km), Eagle Marsh Dr. (2 km), Sulpher Cr. (2 km).

Tactics:
1. Check files for previous information, map from base map.
2. Low level, oblique angle video by helicopter.
3. Ground truthing and survey as per Aquatic Survey Manual or Twelve Mile Creek fish population survey by Sarvis (1985).
4. Select the appropriate number of fish population index stations according to the following schedule:

Index Station Schedule

Priority	Stream or Drain	Number of Stations
1	Welland River	10
2	Twenty Mile Cr.	9
3	Mckenzie Cr.	7
4	Boston Cr.	6
5	Twelve Mile Cr. (lower reaches)	7
6-7	Fifteen Mile Cr.	5
	Sixteen Mile Cr.	each
9	Twelve Mile Cr. (upper reaches)	6
8, 10-13	Oswego Cr., Lyons Cr. to North Cr. Dr.	4 each
14-17	North Forks Dr. to Beaver Cr. (Lake Erie)	3 each
18-40	Big Forks Dr. to Sulpher Cr.	2 each

Canals

Welland Canal, old Welland Canals, associated Turning Basins.
Chippawa-Queenston Power Canal
Welland Canal Feeder Canal
Management Direction - still to be determined.

Map 3 Fisheries Related Information

Ministry of Natural Resources
Ontario

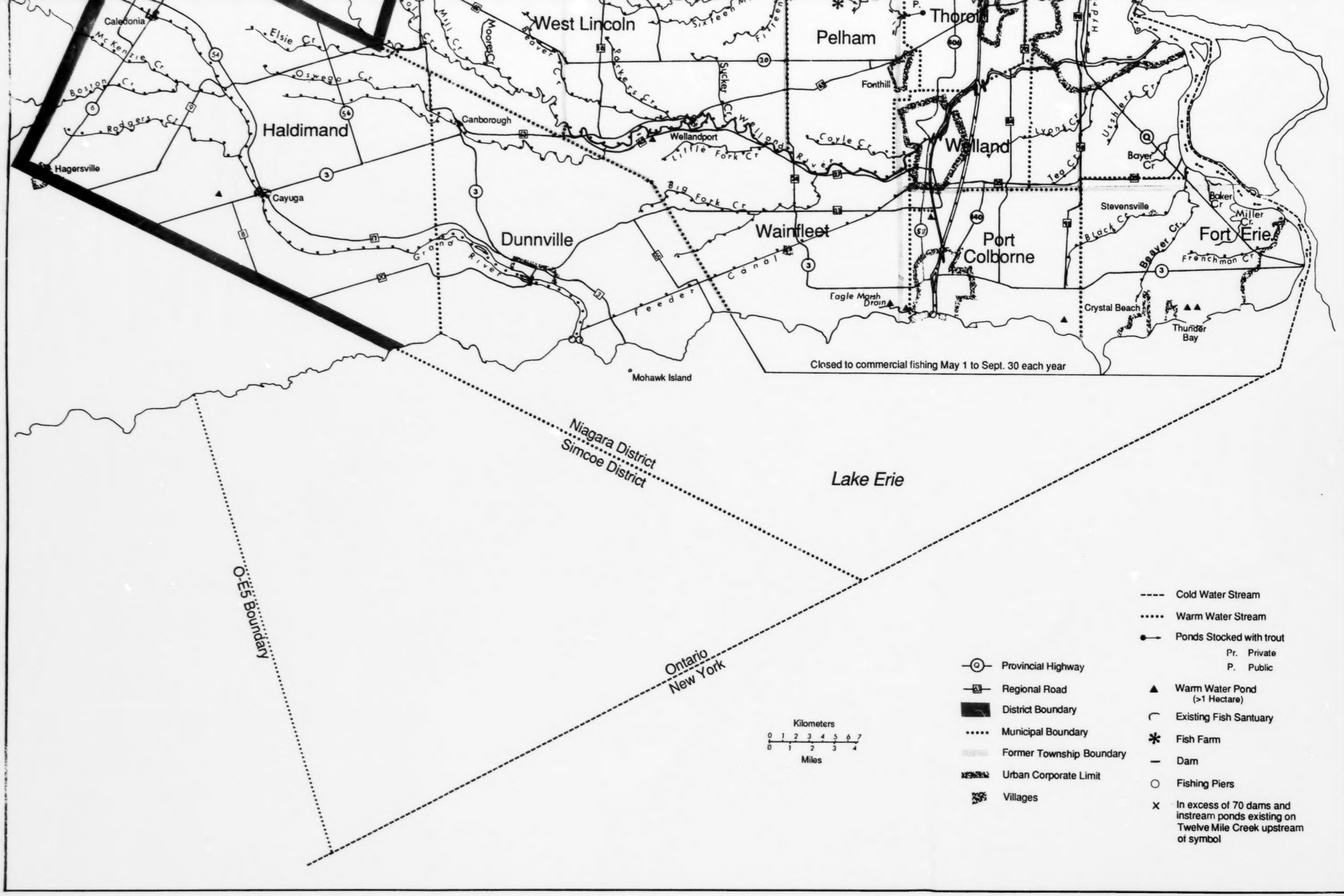
Lake Ontario

Cambridge District

Grimsby
Beamsville
Vineland
Lincoln
Smithville
West Lincoln
Caledonia
Haldimand
Hagersville
Cayuga
Canborough
Wellandport
Dunnville
Wainfleet
Pelham
Fonthill
Thorold
St. Catharines
Niagara - on - the - Lake
Virgil
St. Davids
Niagara Falls
Welland
Port Colborne
Stevensville
Fort Erie

Forty Mile Cr
Thirty Mile Cr
Twenty Mile Cr
North Cr
Spring Cr
Sixteen Mile Cr
Fifteen Mile Cr
Elsie Cr
McKenzie Cr
Boston Cr
Rodgers Cr
Oswego Cr
Mill Cr
Moores Cr
Beaver Cr
Forkers Cr
Sucker Cr
Welland River
Little Fork Cr
Big Fork Cr
Coyle Cr
Six Mile Cr
Eight Mile Cr
Four Mile Cr
Two Mile Cr
Twelve Mile Cr
Niagara River
Welland Canal
Lyons Cr
Tea Cr
Usher Cr
Bayer Cr
Baker Cr
Miller Cr
Black Cr
Frenchman Cr

N


Caledonia
McKenzie Cr
Elsie Cr
Oswego Cr
Boston Cr
Rodgers Cr
Haldimand
Hagersville
Cayuga
Canborough
Moore Cr
Mill Cr
Bover Cr
West Lincoln
Parkers Cr
Sixteen Mile Cr
Fifteen Mile Cr
Sucker Cr
Wellandport
Little Fork Cr
Welland River
Big Fork Cr
Dunnville
Grand River
Feeder Canal
Mohawk Island
Pelham
Thorold
Fonthill
Welland
Coyle Cr
Lyons Cr
Tea Cr
Usher Cr
Bayer Cr
Baker Cr
Miller Cr
Stevensville
Black Cr
Beaver Cr
Fort Erie
Frenchman Cr
Port Colborne
Wainfleet
Eagle Marsh Drain
Crystal Beach
Thunder Bay
Closed to commercial fishing May 1 to Sept. 30 each year
Niagara District
Simcoe District
Lake Erie
O-E5 Boundary
Ontario
New York
Kilometers
0 1 2 3 4 5 6 7
Miles
0 1 2 3 4
Provincial Highway
Regional Road
District Boundary
Municipal Boundary
Former Township Boundary
Urban Corporate Limit
Villages
Cold Water Stream
Warm Water Stream
Ponds Stocked with trout
Pr. Private
P. Public
Warm Water Pond (>1 Hectare)
Existing Fish Santuary
Fish Farm
Dam
Fishing Piers
In excess of 70 dams and instream ponds existing on Twelve Mile Creek upstream of symbol

Map 4 Fisheries Management Tactics

Ministry of Natural Resources
Ontario

Lake Ontario

Cambridge District

Grimsby

Forty Mile Cr.

Thirty Mile Cr.

Beamsville

Vineland

Lincoln

Twenty Mile Cr.

North Cr.

Smithville

Spring Cr.

Sixteen Mile Cr.

Fifteen Mile Cr.

West Lincoln

Pelham

Thorold

Niagara Falls

Niagara - on - the - Lake

St. Catharines

Chinook
Coho
Brown Trout

Brown Trout

Rainbow Trout

Brown Trout

Rainbow Trout

Lake Gibson

Lake Moodie

Twelve Mile Cr.

Eight Mile Cr.

Six Mile Cr.

Four Mile Cr.

Two Mile Cr.

Virgil

St. Davids

Hydro Canal

Niagara

Ussher Cr.

Lyons Cr.

Tee Cr.

Bayer

Stevensville

Welland

Welland Canal

Coyle Cr.

River

Fonthill

Wellandport

Canborough

Sucker Cr.

Parkers Cr.

Beaver Cr.

Moores Cr.

Mill Cr.

Wolf Cr.

Elsie Cr.

Oswego Cr.

McKenzie Cr.

Boston Cr.

Rogers Cr.

Caledonia

Haldimand

Hagersville

Cayuga

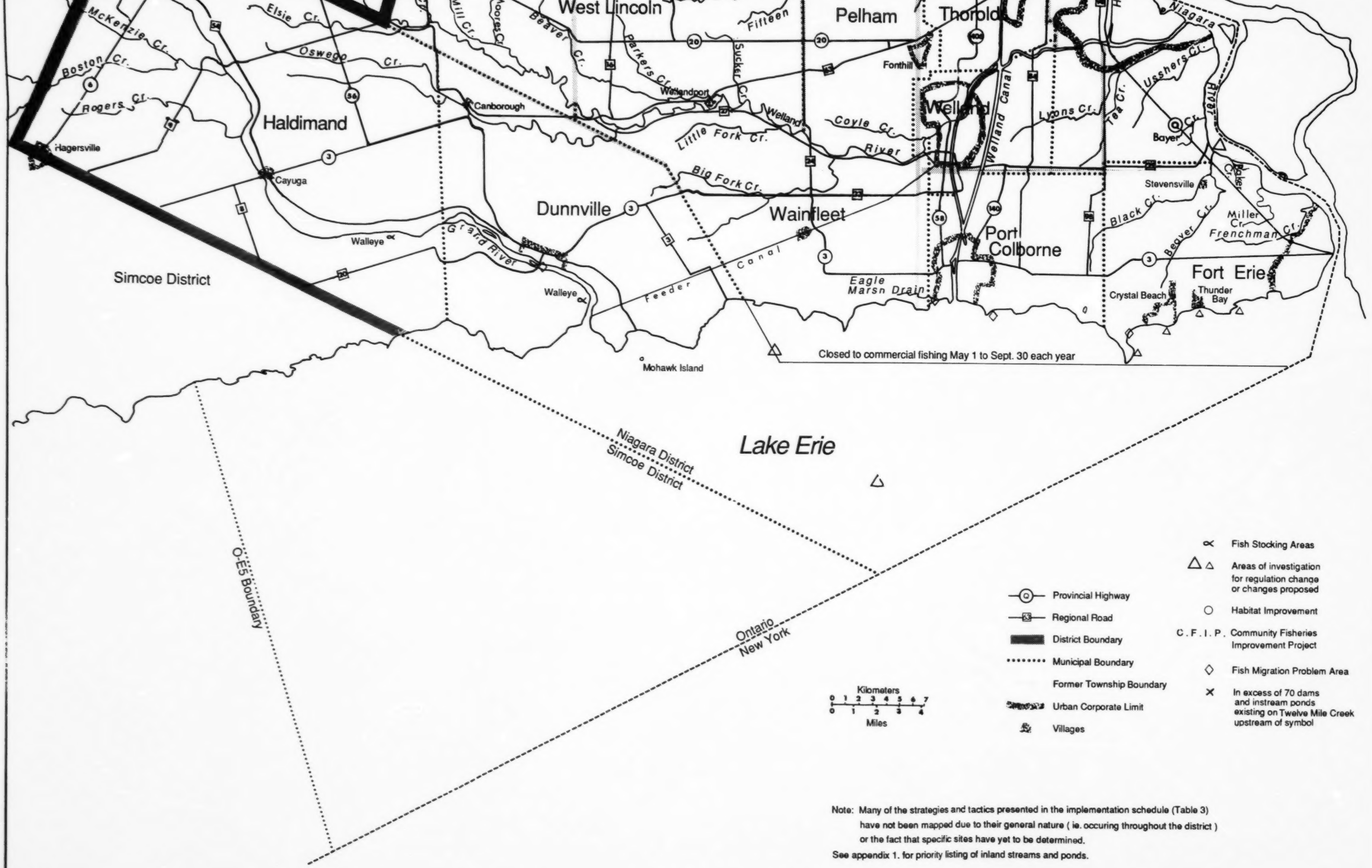
Little Fork Cr.

Big Fork Cr.

Dunnville

Weinfleet

N



Note: Many of the strategies and tactics presented in the implementation schedule (Table 3) have not been mapped due to their general nature (ie. occuring throughout the district) or the fact that specific sites have yet to be determined.

See appendix 1. for priority listing of inland streams and ponds.